OCTOBER 1982 $1.50

Popular Mechanics

WHERE THE RUSSIANS ARE HEADING IN SPACE

IN COLOR

CARS: ALL THE AMERICAN '83s

Detroit Says Muscle... Flash... Convertibles!

1983 FORD MUSTANG

STEREO: PM Picks The 3 Best Systems

PLANS: Build Our Sturdy Workbench Designed For Your Garage

Low-Cost Space: How To Add An Enclosed Porch

INSIDE: 25 Ways to Fix Up Your Car

WOODWORKING

Our Master Craftsman Shows Easy-To-Use Router Skills

Complete Guide To Nails, Screws And Other Fasteners

0 754744 10

© Eastman Kodak Company, 1982

WATCH THE SHADOWS DO A DISAPPEARING ACT WITH KODAMATIC™ INSTANT CAMERAS & FILM.

WATCH AN INSTANT BECOME A BEAUTIFUL INSTANT PICTURE. LIKE MAGIC. Our uncanny electronic flash magically measures the light and adds just the right amount, every time.

IT RECHARGES SO FAST, you're ready to catch the next magic moment.

AND, WITH NOTHING TO FOCUS AND NEW FASTER FILM, you won't miss a trick. You'll get a crisp, beautiful instant picture, after picture, after picture.

MAGICAL WARRANTY. The 980L and the 970L are warranted for 5 full years, the 960 for 3! If, with normal use, your camera malfunctions, return it for free repair through your dealer in Kodak products. **CAPTURE THE MAGIC YOU'VE BEEN MISSING.**

KODAMATIC

Instant Cameras from Kodak.

Kodamatic

THE TOUGH NEW WINCHESTER SECURITY PUMPGUN. THOSE WHO TREAT IT THE WORST RESPECT IT THE MOST.

Ask any law officer to describe the ideal shotgun, and you'll hear words like tough, rugged, and reliable. That's the way we build our security pumpguns. And for good reason. They get battered in the trunks of police cruisers, drenched with salt spray on coastal patrol, dragged through the brush, and scraped on the pavement.

There's a lot more that goes into every Winchester security shotgun...features that make it the best partner you can have. There's 12-gauge power and impressive magazine capacity. You can load 3" or 2¾" shells, magnum or standard, shot or slugs, interchangeably. Recoil-assisted action unlock gives you lightning-fast followup shots, and twin slide bars won't bind in rapid fire. One-pin receiver group disassembly makes cleaning and inspection a breeze.

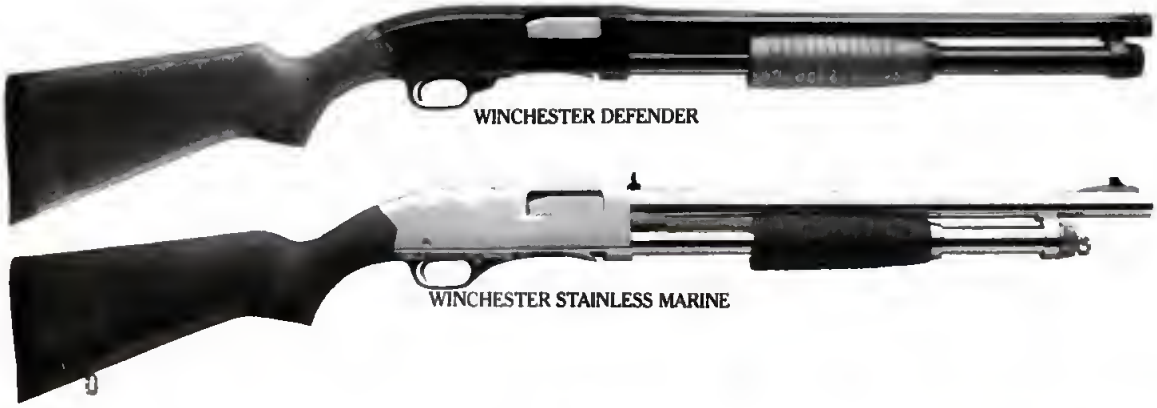
The Defender™ is our best seller for general security. It features a low-glare blue finish and an economical price tag. The magazine holds seven 2¾" shells, plus one in the chamber when ready to fire.

The Stainless Marine™ is a perfect choice for saltwater use or wherever corrosion is a problem. Its stainless barrel and bright triple-plated copper/nickel/chrome finish resist saltwater corrosion with minimal care. Magazine capacity is six 2¾" shells.

For superior firepower, fast handling, and absolute dependability – backed by a full 5-year warranty* – now there's an indisputable choice: the new Winchester security shotguns.

*For a copy of the warranty, see your dealer or write to:

U.S. Repeating Arms Company
275 Winchester Avenue, New Haven, CT 06511



WINCHESTER DEFENDER

WINCHESTER STAINLESS MARINE

WINCHESTER.
more than a gun,
an American legend.

Winchester trademarks licensed from Olin Corporation.

This One
L31W-S6Y-U11T

Come to where the flavor is.
Come to Marlboro Country.
FILTER CIGARETTES
Marlboro
Marlboro
100's
Marlboro Red or Longhorn 100's–
you get a lot to like.
© Philip Morris Inc. 1985
Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.
Kings: 16 mg "tar," 1.0 mg nicotine—100's: 16 mg "tar,"
1.1 mg nicotine av. per cigarette, FTC Report Dec.'81

On the cover

Ford's 1983 Mustang is one of the cars that Detroit hopes will lead a domestic recovery in the new model year PM's color features on all the new models from Ford, GM, Chrysler and AMC begin on page 100
—PM photo by Dean Russell (Ford Motor Co.)

Popular Mechanics®

OCTOBER 1982 CONTENTS VOLUME 158 NUMBER 4

INTERNATIONAL EDITIONS CARIBBEAN, MEXICO, SOUTHERN HEMISPHERE

Special features:

Where the Russians are headed in space
With the U.S. out of the manned exploration game, the Soviets have big plans for the solar system. **110**

Woodworking—how to use your router
PM's Master Craftsman examines a versatile shop tool **114**

25 ways to fix up your car
Add comfort, performance and lasting value with these tricks. **142**

An enclosed porch you can add on
PM shows you the low-cost way to add home space **118**

PM picks the best stereo
Our nominations for the units you can use in large areas or close quarters **94**

A garage workbench you can build
You'll have a work area custom-designed for auto projects **128**

Guide to fasteners
Save PM's complete guide to nails, screws and all fasteners **35**

Automobiles and bikes
13 Imports and Motorsports
24 Detroit Listening Post
48 Car Clinic
64 The PM Garage
84 Firsthand Report: Driving the Porsche 944
100 Driving the '83 GM cars
102 Driving the '83 Fords
104 Driving the '83 Chryslers
106 Driving the '83 AMCs

Shop and crafts
32, 54, 55 Hints from readers
56 The PM Workbench
66 New Now for home and shop
76 Build this inexpensive magnetic lathe chuck
114 A craftsman's secrets for using a router
118 Double-deck porch adds two party rooms
122 Workshop Minicourse: Using squares in the shop

Home and yard
20 PM looks at a kerosene heater
35 How to pick the right fastener for the job
43 Homeowners' Clinic
52 Appliance Clinic

Science and engineering
60 Science Worldwide
110 Where are the Russians headed next?
191 Cold capsule
192 Germany's "cool" coal fire
194 The world is their atrium
194 Man as accessory
194 Water-driven tools

Photography
33 PM photo hints
97 New cameras that make photography easy

FALL CAR CARE GUIDE
123 Cover
128 Build PM's garage workbench
132 Build PM's tool dolly
137 What you should know before buying auto parts
142 25 tips from the pros: Service secrets and shortcuts
158 Saturday Mechanic looks at the '83 GM cars
162 Saturday Mechanic looks at the '83 Ford cars
166 Saturday Mechanic looks at the '83 Chrysler cars
170 Saturday Mechanic looks at the '83 AMC cars
178 Finding a good mechanic when you can't do it yourself

Electronics, radio and TV
22 PM Electronics Monitor
75 PM Software Monitor
94 Best stereos for penthouse or playroom

Boating and outdoors
28 All Outdoors
108 Fine new fibers fight the cold

Aviation
88 The ultralight you can take anywhere
91 Singles, anyone?
191 A guiding light by day or night
191 New lightning scare

Every month
8 Letters
14 Notes from the Editor
191 Technology Update

Worth writing for
Looking for more ideas and information? See page 161.

AS A SERVICE TO READERS. *Popular Mechanics* publishes newsworthy products, techniques and scientific and technological developments. Due to possible variance in the quality and condition of materials and workmanship, *Popular Mechanics* cannot assume responsibility for proper application of techniques or proper and safe functioning of manufactured products or reader-built projects resulting from plans published in this magazine.

POPULAR MECHANICS (ISSN 0032-4558) is published monthly by The Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A. Subscription prices: United States and possessions, $11.97 for one year; $21.97 for two years. Canada and all other countries, add $16.00 for each year. Second-class postage paid at New York, N.Y., and additional mailing offices. Authorized as second-class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as second-class matter at the Post Office at Mexico D.F., Mexico, June 20, 1950. © 1982 by The Hearst Corporation. All rights reserved. Printed in U.S.A.

POSTMASTER: Please send address changes to Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350.

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery either to the Postal Service or alternate carriers within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. ■ Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or renewing your subscription. ■ Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

Use this address for subscription orders & inquiries } POPULAR MECHANICS P.O. Box 10064 Des Moines, Iowa 50350 { POSTMASTER, Please send address changes to this address

I've earned my Wings!

INSULATED

Red Wings

RED WING SHOES®

...warm your hardworking feet.

"When the wind chill dipped to −15° last winter, I really appreciated my insulated Red Wings. They kept my feet warm as pizza. Didn't miss a day of work. These Red Wings are tough work boots specially made for cold, wet jobs like mine. They keep my feet nice and warm, not hot. And the leather's treated to shed water. That's why I wear 'em hunting, too!"

Insulated Red Wings come in work and sport styles, in men's sizes 6-14, widths B-EEE. Some styles with safety steel toes. Find us in the yellow pages under "Shoes."*

For feet that have earned the best.

© 1982, Red Wing Shoe Co., Red Wing, MN 55066

Popular Mechanics

Editor-In-Chief: John A. Linkletter
Executive Editor: Joe Oldham
Managing Editor: Bill Hartford
Design Director: Ira Harrick
Design Consultant: Eberhard Lüthka

Special Editorial Features: Sheldon M. Gallager, editor
Automotive: Tony Assenza, editor; Michael Lamm (West Coast); Gary Witzenburg (Detroit)
Home and Shop: Harry Wicks, editor; Penelope Spangler, Conrad M. Stowers, Steven Willson, assistants
Boating, Outdoors and Travel: Wm. T. McKeown, editor
Electronics: Neil L. Shapiro, editor
Science: Dennis Eskow, editor
Technology: Robin C. Nelson, editor
Editorial Production: Peter Easton, chief; John Bostonian Jr., art; Shannon K. Kelley, Steven C. Fox, assistants
Art: Don Mannes, technical art director; Douglas Quinn, Alan Andresen, assistants

Special Publications: Clifford B. Hicks

Editorial offices: 224 West 57th St., New York, N.Y. 10019. We cannot be responsible for loss of unsolicited queries, manuscripts, or photos. For return, they must be accompanied by adequate postage.

Bureau of Information: Sophia Gronowicz, director; 224 West 57th St., New York, N.Y. 10019. (212) 262-4292

Advertising Manager
Frank P. Camastro

Advertising Offices:
New York: 224 West 57th St., New York, N.Y. 10019; (212) 262-8824
Chicago: 520 North Michigan Ave., Chicago, Ill. 60611; (312) 527-2400
Detroit: 377 Fisher Rd., Grosse Pointe, Mich. 48230; (313) 881-3520
Cleveland: PDC Building, 3659 Green Rd., Cleveland, Ohio 44122; (216) 292-7334
Los Angeles: 460 East Carson Plaza Dr., Carson, Calif. 90745; (213) 532-8101

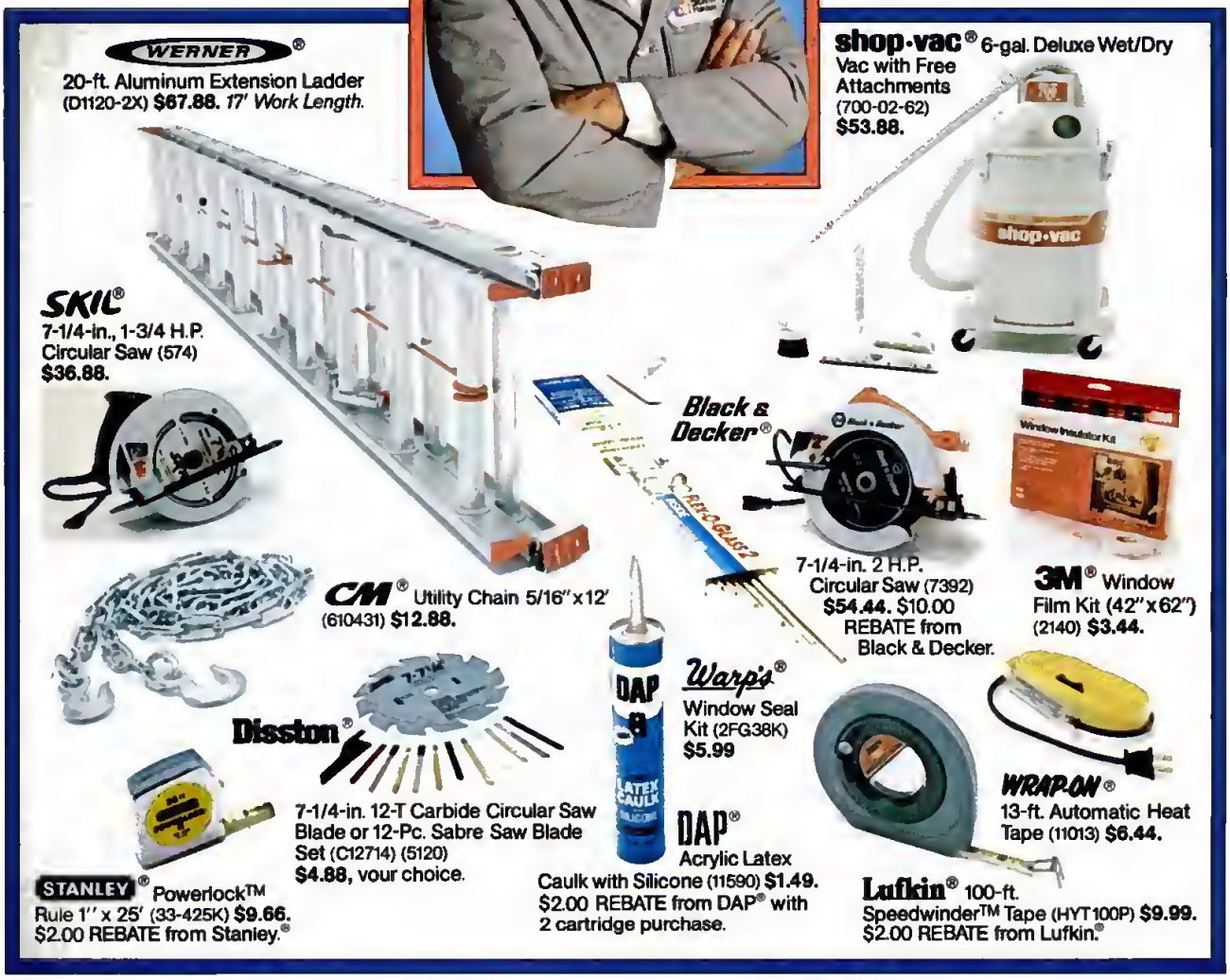
Production Manager: Ronald Tuosto
Advertising Production: Patricia Woods (212) 262-4800
Classified Advertising Manager: H. E. Kappel (212) 262-4825

Published by The Hearst Corporation
President
Frank A. Bennack Jr.
Chairman
Randolph A. Hearst
President, Magazines Division
Gilbert C. Maurer
Publisher, Popular Mechanics
Daniel J. Coleman
Publishing Consultant
Richard E. Deems

POPULAR MECHANICS IS PUBLISHED MONTHLY by the Hearst Corporation, 959 Eighth Avenue, New York, N.Y. 10019, U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Harrison A. Mitnick, Vice President and Treasurer; Harvey L. Lipton, Vice President and Secretary. Hearst Magazines Division: Gilbert C. Maurer, President; K. Robert Brink, Executive Vice President and General Manager; Raymond J. Petersen, Executive Vice President, Thomas J. Hughes, Vice President and Resident Controller; William S. Campbell, Vice President, Director of Circulation. Daniel J. Coleman, Vice President for Popular Mechanics.

Expert advice can make any job easier.

So stop in at Sentry Hardware this fall. Tell our friendly experts what you need to do around the house, we'll recommend the best way to do it. Of course, we can also supply the top, name-brand products you want...at very friendly prices.



When you're ready to do-it-yourself.

Look for us on abc

Check the Yellow Pages under Hardware for the SENTRY store nearest you.

SENTRY™ Hardware

Sentry Hardware Corporation, Cleveland, Ohio 44113.

Merchandise shown in this advertisement is available from participating dealers only. Offer expires October 15, 1982. All Sentry dealers own their own stores. They select their merchandise and set their own prices. There may be variations in products, available quantities and prices in individual stores.

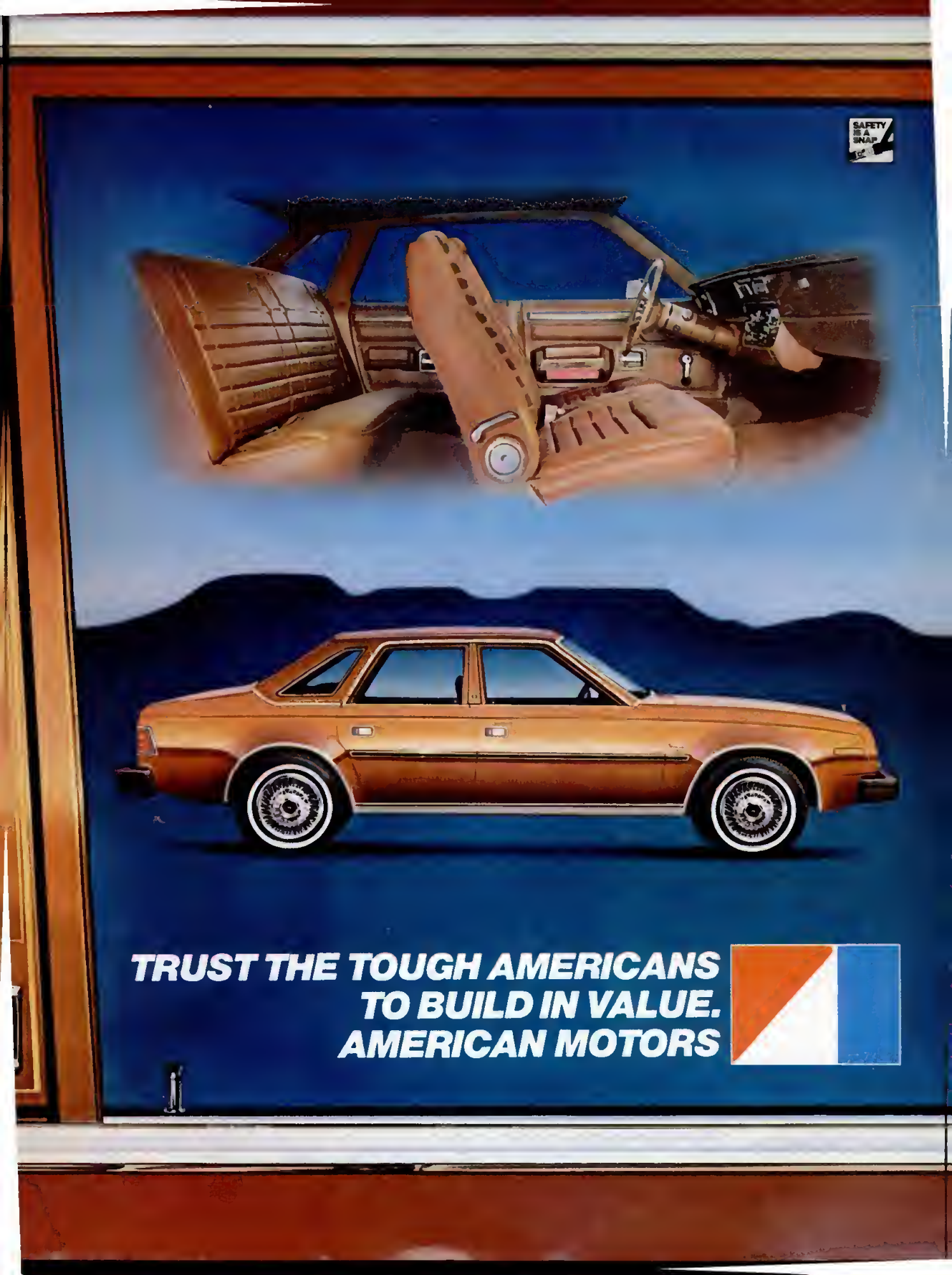
$6995.* CONCORD DL KNOWN BY THE STANDARDS WE KEEP.

FULL VINYL ROOF	STANDARD
4.2-LITER 6-CYLINDER ENGINE	STANDARD
INDIVIDUAL RECLINING SEATS	STANDARD
QUARTZ DIGITAL CLOCK	STANDARD
DELUXE BODYSIDE MOLDING	STANDARD
WHITE SIDEWALL RADIAL TIRES	STANDARD
WIRE WHEELCOVERS	STANDARD
DELUXE EXTERIOR TRIM	STANDARD
FRONT AND REAR BUMPER GUARDS	STANDARD
REMOTE CONTROL EXTERIOR MIRROR	STANDARD
EXTRA-QUIET SOUND INSULATION PACKAGE	STANDARD
WOODGRAIN INSTRUMENT PANEL	STANDARD
EXCLUSIVE BUYER PROTECTION PLAN®	STANDARD
FULL 5-YEAR NO RUST-THRU WARRANTY™	STANDARD
ZIEBART® FACTORY RUST PROTECTION	STANDARD
PRICE	**$6995**

AVAILABLE AT OVER 1500 AMERICAN MOTORS DEALERS NATIONWIDE.

*LIST PRICE EXCLUDING TAX, LICENSE, DESTINATION CHARGES, AND OTHER OPTIONAL OR REGIONAL EQUIPMENT EXTRA. SEE YOUR DEALER FOR WARRANTY AND RUST PROGRAM DETAILS.

Ziebart is a registered trademark of Ziebart International Corporation


SAFETY IS A SNAP
TRUST THE TOUGH AMERICANS
TO BUILD IN VALUE.
AMERICAN MOTORS

LETTERS TO THE EDITOR

Well, they sure were tough, anyway

Robin Nelson's story on reactivating our World War II battleships (*The Born-Again Battlewagons*, page 73, June '82) was great reading. I served on the USS *Iowa* (BB 61) and believe that bringing back these mighty ships is, ton for ton and dollar for dollar, the best defense bargain that has come down the pike in a long, long time.

But you made one crucial error: The armor belt on these battlewagons is more than 17 inches thick, not the 12 inches that you stated.

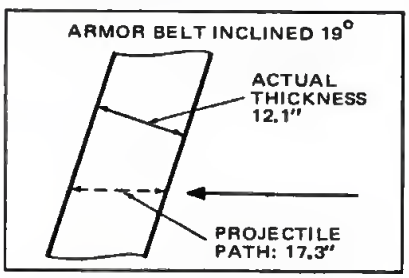
ALVIN R. BROOKS, USN (RET.)
SANTEE, CALIF.

Your story was outstanding. It is well to remember that no U.S. battleship was ever sunk in war action and no aircraft carrier was sunk while being screened by battleships. Those great dreadnoughts were so invincible that shells would bounce off their 17-inch-thick armor (not the 12 inches you said) like tennis balls off a wall.

HENRY M. DUPREE, USN (RET.)
SAN DIEGO, CALIF.

We got a barrage of mail on the armor question, much of it from readers who served on Iowa-class battleships. Actually, we didn't goof, but the Navy has an unusual way of calculating armor thickness. At the outset of the war, there was concern over the apparent lightness of 12-inch armor, so the word was put out that these battleships were protected by a 17-inch armor belt.

Here's how the Navy figured it: Although the armor belt actually was—and still is—only 12.1 inches thick, it was inclined at an angle of 19°, so



that a shell striking a hull broadside would have to pass through 17.3 inches of steel (see sketch). To this day, the Navy still insists that Iowa-class ships have the "equivalency" of 17-inch armor. Whether this bit of mathematical subterfuge fooled the enemy isn't known, but it seems to have comforted our own seamen.

Rocket motorcycles?

Your article *PM Rides The World's Hottest Bikes* (page 61, July '82) covered six "rocket ships," not ordinary motorcycles. The average biker isn't going to own one of these expensive Japanese machines.

How about equal time for American, British and German bikes? Where was that good old favorite, Harley Davidson? It's interesting, however, to read about the latest in bike technology because I realize that the more advanced features of today may eventually be incorporated in the cycles that common folk will be riding tomorrow.

FRED HEWES
KETTLE FALLS, WASH.

Auto Editor Tony Assenza replies: Your last sentence says it as well as we could—it's one reason we cover high-tech developments in many fields. Also, not all of the bikes we mentioned are expensive. You can buy some of them for $3,000. The cheapest Harley goes for $5,000.

Free 'stone' for fences

Your excellent article on rock walls (*Build A New England Stone Fence*, page 84, July '82) left out one important source of material: broken pieces of cement sidewalks and other paving that have been removed on remodeling jobs. These slabs are generally 4 to 5 inches thick and reasonably flat on the bottom, making them easy to stack.

We have a hillside lot with hundreds of feet of retaining walls built with this material. You can usually get all you want free by asking local contractors or going to dumping sites.

VERNON L. LINN
SUMAS, WASH.

No five-dollar words

Bless you, Mort Schultz! I just finished trying to read my new $18 Celebrity shop manual when I picked up the July '82 issue and found your Saturday Mechanic article *Troubleshooting GM's Computer Command Control* (page 49). I didn't need a college degree or have to wade through five-dollar words to understand the workings of CCC.

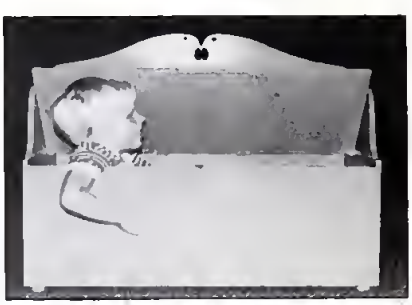
Your article tells me you've actually experienced what you write about. Please continue this kind of detailed, down-to-earth reporting.

W. B. DAVIS
ST. ALBANS, W. VA.

Double-duty toybox/bench

Thought you might like to see a picture (below) of the toybox/bench we built from your plans (*3 More Great Projects With A Scandinavian Flair* (page 122, May '81). We made it for our 5-year-old son, who finds it both useful and fun (as you can see).

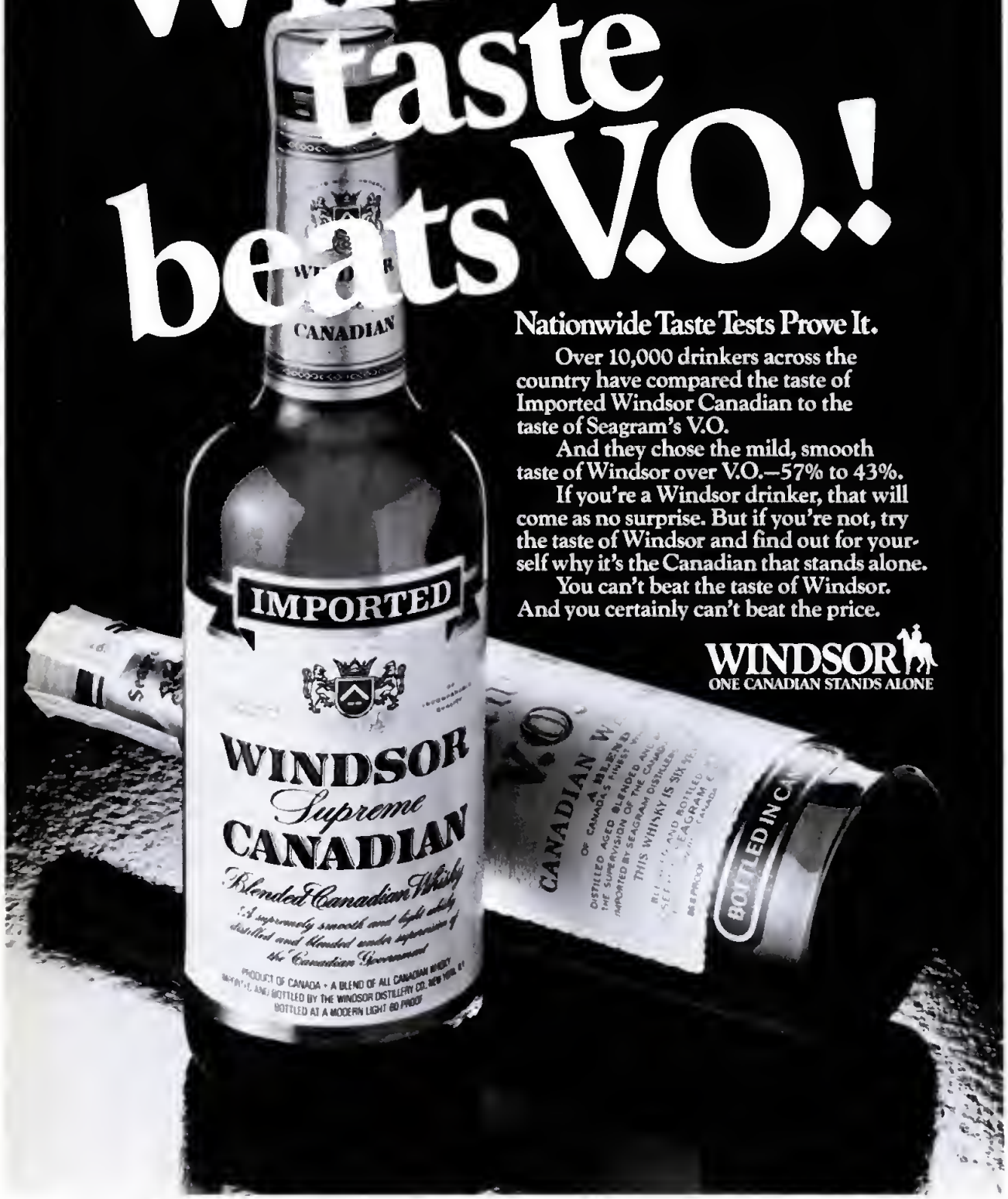
STEVE HAWLEY
NORTH LAND, FLA.



PM's toybox/bench built by reader Hawley. A playful 5-year-old demonstrates ample storage space under lift-up seat.

Thanks for letting us know. For others who may be interested, photocopies of the article, which also includes plans for making a dictionary stand and multilevel table, are available for $2.50 postpaid from Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101. PM

Windsor's taste beats V.O.!



Nationwide Taste Tests Prove It.

Over 10,000 drinkers across the country have compared the taste of Imported Windsor Canadian to the taste of Seagram's V.O.

And they chose the mild, smooth taste of Windsor over V.O.—57% to 43%.

If you're a Windsor drinker, that will come as no surprise. But if you're not, try the taste of Windsor and find out for yourself why it's the Canadian that stands alone.

You can't beat the taste of Windsor. And you certainly can't beat the price.

WINDSOR
ONE CANADIAN STANDS ALONE

CANADIAN WHISKY–A BLEND • 80 PROOF • IMPORTED AND BOTTLED BY THE WINDSOR DISTILLERY COMPANY NEW YORK, N Y ©1982 NATIONAL DISTILLERS PRODUCTS CO

CAMEL

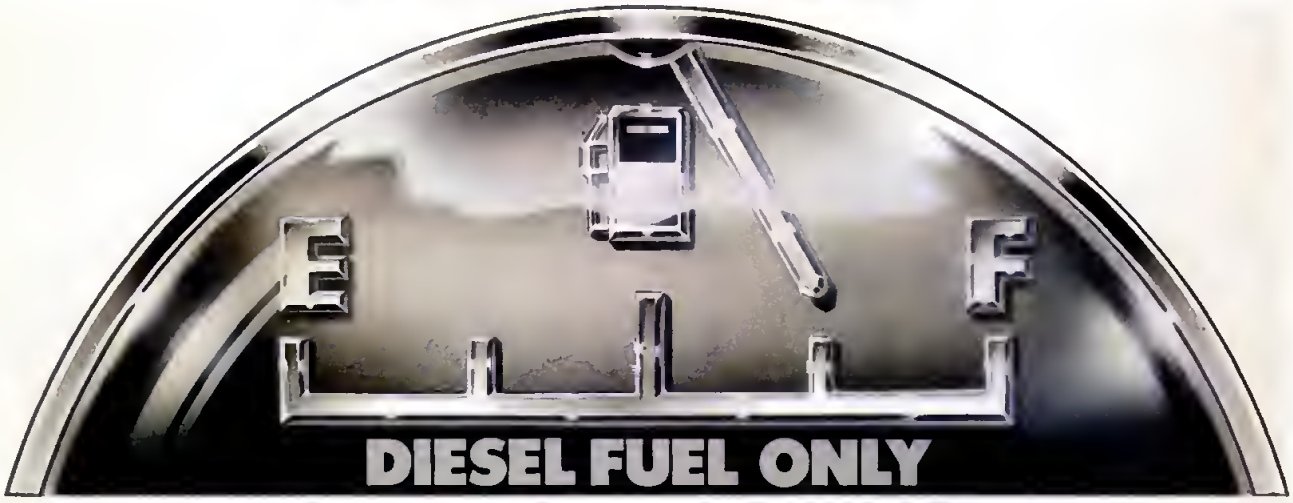
Where a man belongs.

Experience the Camel taste in Regulars, Lights and Filters.

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

PUT ONE OF THESE GMC DIESEL TRUCKS TO WORK AND WATCH IT SAVE.

GMC is a division of General Motors.



GMC diesel pickup.

GMC diesel Suburban.

GMC diesel van.

GMC diesel Jimmy.

They're powered by an optional 6.2 liter truck diesel.

An engine that's built to do a truck-size job of hauling or towing. With the traditional diesel features of rugged construction and efficiency of operation. See the mileage estimates for GMC 2-wheel-drive, diesel trucks and the projected estimates for the 4-wheel-drive Jimmy below. Diesel power is also available in 4-wheel-drive pickup and Suburban models. See the full line of full-size diesel trucks at your GMC truck dealer. And, wherever you go, buckle up for safety.

2-wheel-drive diesel pickup	EST. HWY.	31	EPA EST. MPG	21
2-wheel-drive diesel Suburban	EST. HWY.	30	EPA EST. MPG	20
G2500 diesel van	EST. HWY.	30	EPA EST. MPG	20
4-wheel-drive diesel Jimmy	EST. HWY.*	27	EPA EST. MPG*	19

Use estimated MPG for comparison. Your mileage may differ depending on speed, distance, weather. Actual highway mileage lower. Estimates lower in California. Some GMC trucks are equipped with engines produced by other GM divisions, subsidiaries, or affiliated companies worldwide. See your GMC truck dealer for details.

*GMC projections of 1983 mileage estimates. See your dealer for actual EPA estimates.

Official Truck of the XXIIIrd Olympiad Los Angeles 1984

GMC

TRUCKS ARE WHAT WE'RE ALL ABOUT.

IMPORTS & MOTORSPORTS

Motor racing in the sky

PM photo Phil Berg

On his Pikes Peak run in the Audi Quattro, John Buffum set new Pro Rally record time.

It's an uphill drag race, except all those switchbacks keep getting in the way. If you're driving, you'd better be good or you'll drop off the edge and find yourself skydiving, but without even a drag racer's parachute. In a hill climb, the cars run against the clock, so there's no way for the competition to bump you off the mountain, where you'd quickly accelerate at 32 feet per second squared. This year at Pikes Peak, the Colorado competition that's been on the motorsports calendar since 1916, no one took the fast way down and a lot of new records were set. Undisputed king of the hill is Bill Brister who was the fastest ever up the 14,110-foot summit with an 11-minute, 44.82-second run in his Wells Coyote. The starting line, which is at the 9,000-foot mark, also saw John Buffum in the Audi Quattro grab gravel and hit the top in 12:50.52. That's a Pro Rally record. Another record run was made by Ralph Bruning, who set a 12:50.28 stock car time in his Chevy Monza. Younger Unsers were running in the 60th Annual Pikes Peak Hill Climb on the mountain that has seen dozens of victories by Bobby, Al and assorted forebears. In the Open Class, Al Jr. screamed up in 11:54.30, which makes him the fastest Unser ever up the Peak—no mean feat. Watching all these cars goin' against gravity and the clock may not compare to settin' on the edge of your seat for 500 miles of NASCAR drafting, but don't knock it—at least 'til you've been to the mountain.

Fastest ever up Peak was Bill Brister.

Sold before it's seen

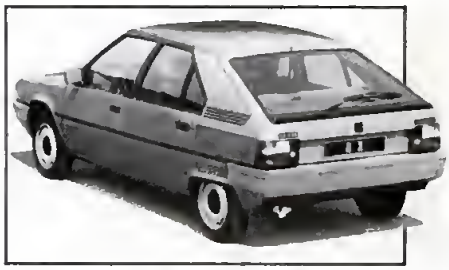
Mercedes sport coupe for '84 is our idea of the perfect size for modern touring car.

It's got to be a really exciting car to be so anxiously awaited that buyers put down their deposits while the assembly line is still being set up. Right now, the wait is on for the Mustang convertible and new Corvette, for example. And we suspect that Mercedes buyers will be preordering the 1984 W201 coupe when they see it pictured here. The coupe (and a wagon) will probably follow by some months the four-door sedan which goes on sale here next year (see "Mini Mercedes," *Imports & Motorsports*, page 14, July '82). We love the scale of this 175-in.-long jewel, especially compared to Mercedes' other coupe, the 380SEC S-class, which is just too *huge* for our definition of a sport coupe.

Marshmallow memories

Since Peugeot is doing such a nice job supplying us with silky smooth French cars, we won't moan—too much—about not being able to get Citroens anymore. But, ah, those DS saloons with their front-wheel drive and self-leveling hydropneumatic suspensions; they opened our eyes to the dazzling world of cars 20 years ago. Recently, we reported on the magnificent CX and the compact Visa (*The Cars We Can't Get Here*, page 112, Apr. '81). Now there's a smart new model that's sure to provide that dreamy, marshmallowy Citroen ride.

Citroen BX hatchback: notch below CX.



BX is lightweight for its size through heavy use of light alloys and plastics.

The BX only went into production last month, so we'll have to wait to see exactly how soft the ride is. Meanwhile, we'll just reminisce about driving that old friend's daddy's DS. PM

THE AFFORDABLE ROTORWAY EXEC

Financing available on approved credit.

The dream of owning a personal whirly bird with the speed and style of a corporate helicopter has now come true with the RotorWay Exec. The Exec is a 20-year evolution in design. It's everything RotorWay ever dreamed of producing in a light transportation machine. When you see it, you'll want to take a ride... and when you do, you'll want to own it. The Exec provides 3-dimensional mobility with Cadillac ride and style. If you like whirly birds you'll fall in love with the Exec. Take the first step — order the information pack today! We'd love to send it no charge, but with the high costs of postage ad space and printing, we just can't. Meet us halfway for the time of your life.

Send for our beautifully illustrated evaluation package. An exciting new multi-fold full color brochure especially prepared to assist you in examining the Exec's design and performance specifications. A step-by-step description of the RotorWay program and how you can be a part of it. Includes a 24 x 36 poster-size exploded view of all major components, 3-view drawings, autorotation information, price list and a special offer.

ORDER YOUR PACKAGE TODAY.

RotorWay AIRCRAFT INC.
14805 S. Interstate 10 • Tempe, Arizona 85284

Credit Card Customers. To Order Package.
Call Toll Free Now:
U.S. 800-824-7888
California 800-852-7777
Alaska & Hawaii 800-824-7919
Ask for operator number 169
Send me all the information on the RotorWay Exec Immediately.

☐ Enclosed is $12.00 ($25.00 Foreign)
Charge to
☐ American Ex. ☐ MasterCharge ☐ VISA

(Acct #) (Exp. Date)

(Signature)

Name _____

Address _____

City _____ State _____ Zip _____

ROTORWAY AIRCRAFT, INC.
14805 S. I-10, TEMPE, AZ 85284 2PM10

EDITOR'S NOTES

John A. Tillotson

PM's favorite cover artist, Ed Valigursky, has a new place for painting. It's the handsome new double-deck porch (page 118) he recently added to his home in New Jersey. True to Popular Mechanics tradition, Ed did most of the carpentry himself—and, of course, finished the job by applying the stain and paint.

Now we have our own kind of cover artist: A man who paints paintings on a porch he painted himself.

What it all proves is that there's no limit to what we expect in the way of do-it-yourselfing around here.

Cover artist paints outside . . . and inside his porch.

When over half a million fans show up for any one aviation event, you can be sure Americans still love airplanes. It happened again at Oshkosh, Wis., this year—and PM was there. Like last year, we brought along almost 100 aviation-oriented friends of the magazine.

The event was the annual EAA (Experimental Aircraft Assn.) Fly-In. Some 12,000 planes were there: private craft, homebuilts, ultralights, warbirds.

We celebrated at a lunch featuring Dr. Igor Bensen as speaker. He's the inventor of the famed Bensen Gyrocopter and, more to the occasion, the "Airborne Octopus" that appeared on our September cover.

We did some flying, too, before and after the Oshkosh event. Shel Gallager, special features editor, was in the air much of the Fly-In week getting pictures for our upcoming article on new homebuilts. I took off a week earlier at the Dayton Air Show in the back seat of a Navy Blue Angels jet. And Robin Nelson, technology editor, zoomed off in several instrument-laden craft to do this month's *Singles, Anyone?* (page 91).

We're producing one bunch of stories that, no matter how much *you* enjoy reading, *we* had more fun researching! **PM**

At Dayton: Plane captain and friend see me off in back seat of Blue Angels A-4 Skyhawk.

At Oshkosh: Dr. Igor Bensen (second from right) admires "his" September PM cover with me and onlookers (left to right) Shel Gallager, PM staff; Gil Maurer, president, Hearst Magazines; Percy Wood, retired president, United Air Lines.

A COMPLETE SET OF ORANGE SHOP TOWELS

100% Cotton

ONE-HALF GROSS...72 TOWELS! SPECIAL OFFER...ONLY $19.99

plus $3.90 shipping and handling

Send Your Order Today!

Re-order information shipped with each order!

FIRST TIME EVER...

BRAND NEW 100% COTTON, LARGE ORANGE SHOP TOWELS!
(approximately 16" x 16" when washed)

The same high-quality commercial-grade shop towels used by service stations, garages, printing plants, repair shops, maintenance services and thousands of other businesses throughout the country . . . NOW offered FOR SALE at an almost unbelievable low, low price!!

Now . . . all the clean shop towels you need . . . right at your fingertips.

- No more searching for clean rags!
- No more "making do" with non-absorbent, lint-filled, odd-sized rags!
- No more flimsy, fall-apart paper towels!
- No more waiting for laundry services!
- NO MORE HIGH PRICES! (Buying our Towels costs a fraction of renting!)

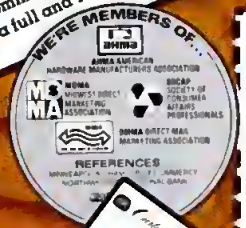
Our shop towels are soft, strong, absorbent, washable and large. Great for home, office, shop, garage or plant . . . washing windows, dusting, cleaning anything!

These are **not** "cheap" towels . . . **not** used towels . . . **not** "seconds" . . . **not** anything but brand new, quality commercial-grade towels.

If not completely satisfied, return them for a full and immediate refund.

SURPRISE FREE GIFT!!

To encourage you just to try a set of Shop Towels we'll send you a valuable Surprise Free Gift – yours to keep even if you return your Shop-Towels!



D.R.I. Industries, Inc.
Dept. PM-1082
11100 Hampshire Ave. So., Bloomington, MN 55438
Made in China

ORDER TODAY . . . IT'S EASY!
Fill in order form and send with check, money order, purchase order or credit card information.
Credit card buyers can also call our 24-Hour Toll-Free Order Number: 800-228-5000
(In Nebraska 800-642-8777).

98245

SPECIAL OFFER COUPON

Try them FREE of obligation to keep!

If not totally satisfied, you can return your order any time for a complete refund, including shipping and handling.

Send to & make remittance payable to:
D R I Industries, Inc. Dept. PM-1082
11100 Hampshire Ave., So., Bloomington, MN 55438

_____ sets (72 Towels per set) @ $19.99 plus $3.90 shipping and handling for each set = $ _____
How Many?
(MN residents add 5% sales tax.)

CHECK METHOD OF PAYMENT (✓)
☐ I've enclosed my check, money order or purchase order.
☐ Charge it to ☐ VISA ☐ MasterCard
☐ American Express ☐ Diners Club ☐ Carte Blanche

Card No. _____ Exp. Date ___/___

Signature X _____
(Need to sign only if charging order)

PLEASE PRINT
MR
MRS _____
MISS
First M.I. Last

ADDRESS _____
Street & Number

CITY _____ STATE _____ ZIP _____

MAG-40

EQUIPMENT AND TRAINING NO OTHER SCHOOL CAN MATCH!

NTS HOME TRAINING INVITES YOU TO EXPLORE MICROCOMPUTERS, DIGITAL SYSTEMS AND MORE WITH STATE-OF-THE-ART EQUIPMENT YOU ASSEMBLE AND KEEP!

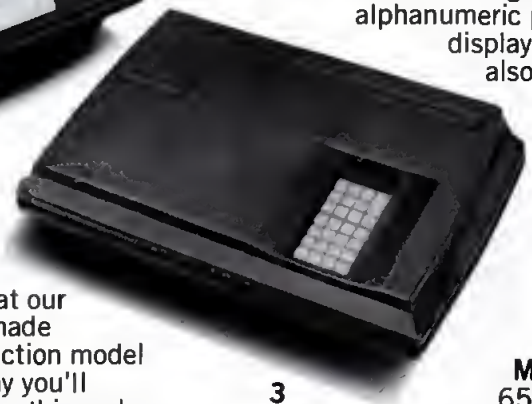
1

When it comes to electronics home study, no school matches the training you get from NTS.

For example, three microcomputer/microprocessor courses are available to the Electronics Beginner—Tech Writer—Analog Technician & Engineer. For your "hands-on" training, each course includes its associated microcomputer for you to assemble and keep. You will not only become acquainted with the fundamentals of troubleshooting, but also learn to communicate with a computer using high-level BASIC programming language and Disc Operating Systems (DOS) software.

It's also important to note that our microcomputers are not home-made training devices. They are production model micro-systems, identical to many you'll encounter in the field. We believe this makes your training a lot more exciting and relevant.

2



3

NTS's Master Course in Microcomputers includes the **NTS/HEATH HN89A Microcomputer (#1 above).** It features floppy disc storage, "smart" video terminal, two Z80 microprocessors, 32K RAM memory expandable to 64K. Choice of HDOS or CPM operating system.

The NTS/Rockwell AIM 65 Dedicated Microcomputer (#2) is included in our Microcomputer Technology Course. It is a single board unit featuring an on-board 20 column alphanumeric printer with 20-character display. This 6502-based unit also has 4K RAM memory, (expandable,) 8K monitor ROM and 8K advanced BASIC interpreter on ROM. Application Functions: Central Processor—Controller/Monitor—Development System.

The NTS/SYM-1 Microcomputer (#3) is a 6502-based CPU-4K bytes ROM (expandable)—1K RAM (expandable) 51 active I/O lines for versatile interfacing disk drives, ASC II keyboards, cassette tape, etc. It is featured in the Master Course in Electronics and Industrial Technology.

CONSUMER ELECTRONICS—VIDEO SYSTEMS From the latest state-of-the-art Video Systems Technology, NTS offers its popular Color TV Servicing program. You build and keep the NTS/HEATH 25-inch (diagonal) Digital Color TV receiver as part of your "hands-on" training. Choose Communications and you'll train on an NTS/HEATH 2-meter FM Transceiver which you also build and keep. Most programs also include state-of-the-art test equipment as well as a digital multimeter.

Simulated TV Reception

AUTO MECHANICS Few technical fields offer the challenges and opportunities to equal that of the auto industry. To train for it with NTS you'll utilize "shop tested" instruction plus an impressive array of professional equipment, including a solid-state automotive oscilloscope. You'll learn engine diagnosis, motor overhaul, transmissions, and much, much more.

AIR CONDITIONING/HEATING. Equip yourself for opportunities in one of the most essential industries in the world. Learn servicing of commercial, industrial, and residential heating and cooling equipment. Your course includes such equipment as a hermetic unit analyzer, leak detector, and charging-testing-purging manifold set.

HOME APPLIANCES Here's an excellent full, or part-time opportunity with real potential. Saves you money on your own repairs, too! Course covers repair and servicing of washers, dryers, ranges and small appliances. Your equipment includes NTS's amazing circuit trainer, plus a multimeter for testing purposes.

For 77 years NTS has provided quality home training for thousands of students around the world. We look forward to helping you develop important new skills the proven NTS way. Take advantage of this opportunity now. Send the card or coupon today for a free color catalog in the field of your choice. We'll send complete details by return mail.

NO OBLIGATION. NO SALESMAN WILL CALL

NATIONAL TECHNICAL SCHOOLS

TECHNICAL-TRADE TRAINING SINCE 1905
Resident and Home-Study Schools
4000 SO. FIGUEROA ST., LOS ANGELES, CA. 90037

NATIONAL TECHNICAL SCHOOLS Dept. 201-102
4000 South Figueroa Street, Los Angeles, CA 90037

Please send FREE color catalog on course checked below

- ☐ MicroComputers/MicroProcessors
- ☐ Communications Electronics
- ☐ Digital Electronics
- ☐ Industrial Technology
- ☐ Color TV Servicing
- ☐ Auto Mechanics
- ☐ Air Conditioning
- ☐ Home Appliances

Name _____ Age _____

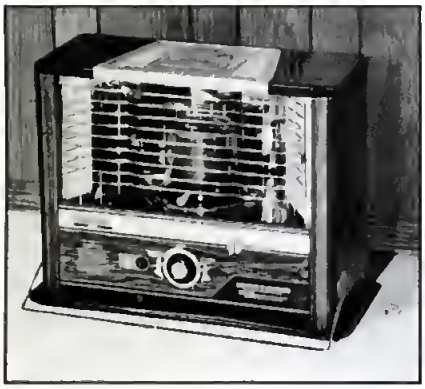
Address _____

Apt. _____ City _____

State _____ Zip _____

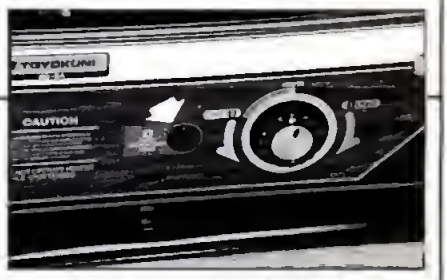
☐ Check if interested in G.I. information.
☐ Check if interested ONLY in classroom training in Los Angeles.

PM LOOKS AT
A KEROSENE HEATER

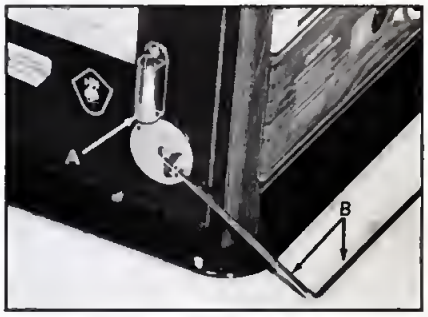


Unit is compact and smart-looking in simulated wood grain. Controls are at the front.

One-gallon fuel tank is removable. Thus, refueling can be done safely out-of-doors.



Heater features an automatic extinguisher (arrow); you simply push the button and the flame is put out immediately.



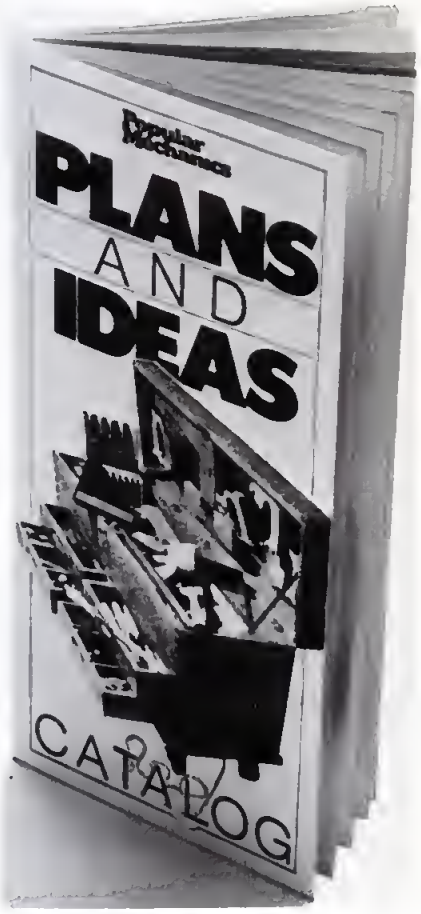
Plumb bob (A) must be aligned in circle for maximum flame efficiency. The outrigger at front (B) prevents the unit from being tipped over to the front.

Because a quality kerosene heater gives good heating value per fuel dollar, more and more people are turning to them these days. The Toyokuni heater shown is a deluxe version with battery-powered electric starter, removable fuel tank (a feature I like a lot) and an automatic extinguishing device. Performance has been first rate and safety is excellent because I observe all safety rules outlined in the manufacturer's instructions.—*H.W.*

SPECIFICATIONS—HEATER

Model: Toyokuni 80-EA — B.T.U./hour: 9,800
Suggested heating area: 360 sq. ft. — Fuel capacity: 1 gal.
Weight (empty): 23 lbs. — Price: $229
Exclusive U.S. marketers: GLO-International Corp., 3975 Dayton Park Dr., Dayton, Ohio 45414

SMART IDEAS



If you're looking for ideas to save time and money — while enjoying what you're doing — send away for PM's catalog immediately.

We have plans for shop tools, boats, storage houses, campers. Scuba tow, ACV, log splitter, air compressor. Smart ideas in furniture! Also dollhouses! Projects the whole family can enjoy.

And best of all — we offer a special and unique service — photocopies of past PM articles. What's more, we tell you the year the projects were published. It may be as early as a 1902 glider to a most recent 1981 solar garden shed. You'll have fun just browsing through the approximately 900 different plans and projects. You'll find our GREAT WORKSHOP series listed. Also our SHOP MINI-COURSES. Timely energy-saving ideas! You'll see it all in our new POPULAR MECHANICS PLANS AND IDEAS CATALOG. **Price $1.00**

SEND FOR YOUR CATALOG TODAY!

Send Your Name and Address with Check or Money Order to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101

Popular Mechanics is a publication of Hearst Magazines, a Division of THE HEARST CORPORATION

28K
COMMODORE VIC
(60% More Power Than VIC-20)

Only!

$259.00

- **Best Service in the USA!**
- **One Day Delivery Express Mail**
- **Most In Stock Accessories**
- **Over 500 Programs To Choose From**
- **Educational-Business-Home-Game Programs**
- **Immediate Refunds**
- **Free Catalogs**
- **We Love Our Customers!**

SPECIAL COMPUTER Sale Price!

FOR THE SPECIAL SALE PRICE OF $259.00 you get the COMMODORE VIC-20 computer *plus* WE ADD 3000, BYTES OF MEMORY to give you 60% MORE PROGRAMMING POWER! This powerful fullsized extra featured computer includes the 6502 microprocessor (LIKE APPLE) 20,000 bytes ROM with a 16K extended LEVEL II Microsoft BASIC, 8000 bytes RAM plug in expandable to 32,000 bytes RAM, 66 key typewriter professional expanded keyboard with graphic symbols on keys, color command keys, high resolution graphics, 512 displayable characters, text display is 22 lines 23 characters, sound and music, real time, upper lower case, full screen editing cursor, floating point decimal and trig functions, string arrays, scrolling, multi statement lines, file managment, PEEK AND POKE. Assembly machine language is available. We have easy to use self teaching books and programs. Accept TAPE-DISK-PLUG IN CARTRIDGES, connects to any TV, includes AC adaptor, R.F. modulator, switch box, self teaching instruction book, comes in a beautiful console case for ony $259.00.

LOW COST PLUG IN EXPANSION

Expansion accessories plug directly into this computer, extra RAM memory, Controllers, a Cassette, A Telephone Modem for only $109.00, an 80 Column Printer for $349.00, even the 170K Disk Drive plugs in direct. You do not have to buy an expansive expansion interface.

WHY SUCH A LOW PRICE

WE GIVE YOU 60% to 400% MORE PROGRAMMING POWER THAN VIC-20! You can't beat our prices for the VIC-20 with increased programming power added! We sell direct to customers. We save you the profit margin normally made by computer stores, department stores, and distributors. We are willing to take a smaller margin to develop volume!

INVEST IN YOUR CHILDREN

Educate your children while they play. Every kid wants to play electronic games. (We have some of the best). The next natural step for their curiosity is to try simple programming. They can do this in 20 minutes with our simple self teaching instruction book. High schools are teaching computer math, science and programming - some start in grammar school.

If you provide this computer as a Teacher and Tutor at home, before you know it your child will be writing computer programs. We have over 500 programs to choose from!! More than 270 educational tapes, complete coverage of small business and home programs, plus a wide variety of the best games! Why pay $140.00 to $295.00 for an electronic game or $100.00 for a 2K toy computer with a flat plastic keyboard? When you can buy this powerful extra featured computer for only $259.00.

IMMEDIATE REPLACEMENT WARRANTY

If your computer fails because of warranty defect within 90 days from date of purchase, you simply send your computer to us via United Parcel Service prepaid. We will "immediately" send you a replacement computer at no charge via United Percel Service prepaid. No one we know gives you this kind of warranty service. Most computer warranty service tekes 30 to 90 days to handle - this fantastic "immediete replecement warranty" is backed by COMMODORE COMPUTER, e MAJOR national brand electronics manufacturar.

TELEPHONE MODEM SALE $109

Plug in your VIC telephone modem. Now you can get a world of information through your telephone, plus electronic mail. Just dial up the information you want. UPI wire service, stock market, historical information by topic from over 60 magazines, including New York Times. Airline information, order tickets, get weather information anywhere in the world, restaurant and hotel information, thousands of categories are on line for you, business, finance, education, entertainment, games etc. YOU'LL BE THE TALK OF YOUR NEIGHBORHOOD. Our telephone modem price is only $109 and includes FREE! one year network membership and one hour on line!

SPECIAL SALE PRICE $259

FOR ONLY $259 you get the POWERFUL 28K COMMODORE VIC with 80% MORE PROGRAMMING POWER THAN VIC-20! 28,000 bytes total memory (20,000 bytes ROM, 8000 bytes RAM and extended LEVEL II BASIC), the professional 66 keyboard, color, sound, music self teaching instruction book, A.C. adaptor, R.F. modulator, T.V. switch box, owners manual plus all the other features listed, in a beautiful console

SPECIAL SALE PRICE $339

FOR ONLY $339 you get the 41K COMMODORE VIC with 400% MORE PROGRAMMING POWER THAN VIC-20! We add 16,000 bytes memory to the VIC-20. You get a total of 41,000 bytes memory (20,000 bytes ROM, 21,000 bytes RAM and extended LEVEL II BASIC) plus all the extra features shown for the 26K COMMODORE VIC.

60K EXPANSION MODULE SALE $109

SWITCH SELECTABLE – 6 SLOT – RESET EXPANSION MODULE allows memory expansion to 60K. You can add up to 6 cartridges, switch select any program you desire, stop and start programs with reset button, not necessary to remove cartridge or turn off computer, saves time, television and computer (one year warranty).

15 DAY FREE TRIAL

DON'T MISS THIS SALE -ORDER NOW

- ☐ Please send me the 26K Commodore VIC Computer for $259.00
- ☐ Please send me the 41K Commodore VIC Computer for $339.00
- ☐ Telephone Modem $109.00
- ☐ 60K Expansion Module $109.00

We ship C.O.D. and honor Visa and Master Card.

Name _____

Address _____

City _____

State _____ Zip Code _____

☐ VISA ☐ MASTER CARD ☐ C.O.D.

Credit Card No. _____

Expiration Date _____

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add $20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NO EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail!

Canada orders must be in U.S. dollars.

we are commodore VIC experts!!

PROTECTO
ENTERPRIZES (FACTORY-DIRECT)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

NEIL SHAPIRO

PM ELECTRONICS MONITOR

Mighty macho memories

If you're a car fanatic, you talk about horsepower. If you're into computers, the buzzword is K-power, as in "He's got 128K." This means the fellow's computer has about 128,000 bits of RAM memory. Note the slang: "*He* has . . . ," not "*His computer* has."

Having a lot of RAM memory in the personal computing subculture is like walking into a bar with Miss Universe on your arm. People who would never once have considered inviting you to join them suddenly think you're a great guy.

Just about every personal computer has additional plug-in memory. This added memory can go far beyond what the computer was designed to use. There are many computers that were bought with 4K of memory and are now fleshed out with 256K of bulging brainpower.

It all seemed pretty confusing. Just *why* were people using all this additional computer memory?

We called Saturn Systems, Box 8050, Ann Arbor, Mich. 48107, makers of big-memory attachments for the Apple II. They shipped us a 128K card ($599) for review.

We plugged it into our 48K Apple II and, suddenly, we were among the 176K elite. After we'd called everyone we knew in the subculture to tell them, we settled in with the manual to find out what was so great about a big-headed computer.

First, we set up their Pseudodisk program. A regular floppy disc machine stores about 120,000 bits of information on a disc. If you have a program stored on disc, your computer reads it. This can take a few seconds. Or, if your computer is searching a very long file on disc for some data (such as a name and address), the search can take up to 20 seconds or so.

Pseudodisk sets up the RAM memory card so your computer thinks the memory is a floppy disc. You move your files from the mechanically accessed floppy disc into the expansion memory.

Once the information is in memory, the time savings become apparent. No more waiting for the disc head to seek the right track—just *pow*—the data is at your fingertips.

Of course, like all RAM memory, a quick power outage can leave your computer with amnesia. So it's a wise move to back up any information you'll need on a real drive.

Other utility programs from Saturn allow you to use their card with the popular Visicalc program (which functions as a super calculation aid) on very large projects. You can use the additional memory in your own long programs, as well.

This card also speeded up word processing. In a long document, there was no need to wait for a disc to get from beginning to end. But, again, you must back up to a real disc.

The design of these cards is tricky. Computers like the Apple are designed with a 64K limit. Saturn and others get around this by something called bank selecting. The computer only sees 64K of memory at a time. Software helps it to jump from one 64K area to another.

We found the additional memory to be one of the most useful additions to a personal computer. Besides, I like to think the pretty secretaries in the office are whispering about me; "I hear he's got 176K of RAM."

Titling trick

When the credits or title of a movie or TV show scroll by, it can involve some expensive special effects. But you can achieve a similar effect in your own video or even celluloid films. The video camera shown above is mounted on a tripod and faces a list of written words or artwork on the wall. Just lower the camera gently with the tripod crank to scroll away.

Watch wrists

Seiko has announced a wrist TV. A tiny liquid-crystal screen straps around your wrist. Headphones plug into the power supply which you carry in pocket or purse or slung off your belt.

Resolution is said to be 31,950 picture elements. And the picture is supposed to hold up in sunlight.

But we can't help wondering at the utility of it all. Can you imagine staring at your wrist for a two-hour *Dallas* special? We're not entirely sure the human body is designed to accept this new device.

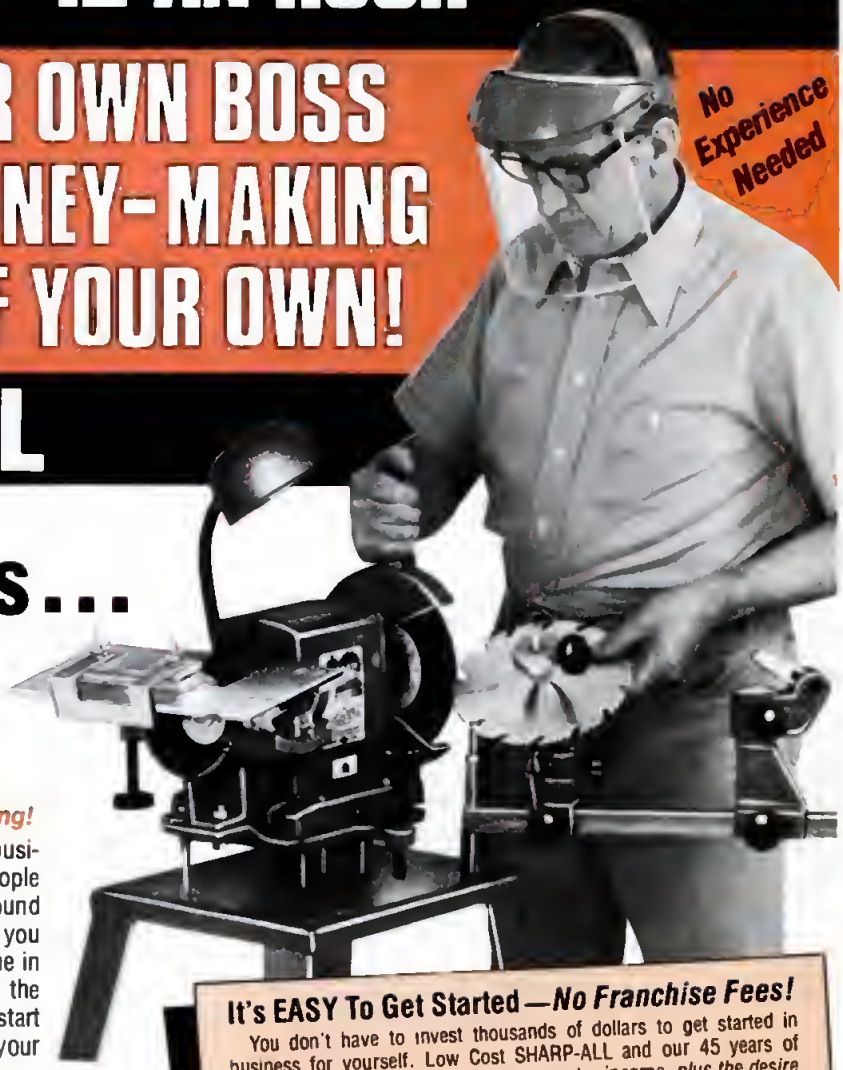
So the next time you see a fellow staring at his watch, he may really be watching *60 Minutes*. PM

EARN UP TO $12 AN HOUR

TURN EXTRA TIME INTO EXTRA INCOME!

BE YOUR OWN BOSS IN A MONEY-MAKING BUSINESS OF YOUR OWN!

No Experience Needed



SHARP ALL

lets you

Sharpen Saws . . .

Shop and Garden Tools for Home and Industry

NOW! *Use your SPARETIME to BEAT inflation and the high cost of living!*

With Sharp-All it's easy to start your own business. No selling is involved, no inventory. People bring in their work . . . you take in year round CASH Profits and keep 90¢ out of every dollar you earn. Work sparetime or fulltime right at home in your garage, basement or tool shed. Work the hours you want — FREE Book tells how to start your own business even while working at your regular job.

Big PROFITS — Plenty of business waiting for qualified men.

Every home and business has saws and tools that need periodic sharpening. There's plenty of business waiting for the man who can sharpen saws, planer knives, jointer blades, wood chisels, scissors, pinking shears, snips, lawnmowers, axes and other garden, shop and home tools. Sharp-All does ALL these jobs and more . . . quickly, and at a big profit. You will be sharpening headquarters for carpenters, builders, lumberyards, factories, home workshops and hobbyists . . . hundreds of jobs right in your own neighborhood.

It's EASY To Get Started—*No Franchise Fees!*

You don't have to invest thousands of dollars to get started in business for yourself. Low Cost SHARP-ALL and our 45 years of experience in helping sincere men earn extra income, *plus the desire to get ahead* is all you need. Fully illustrated Operators Manual gives clear, step-by-step instructions, shows exactly how to sharpen each tool, where to get business, what to charge, how to get free advertising . . . all the "tricks of the trade". And, SHARP-ALL does the kind of precision job that brings customers back time after time.

Send for FREE Book "Lifetime Security." ***Do It Today!***

There is NO OBLIGATION and NO SALESMAN Will Call!

ACT NOW! *Coupon Brings Full Details!*

SEND FOR FREE FACTS TODAY!

You risk nothing by accepting this offer to see how easily you can turn your spare time into Big CASH Profits with your own Complete Sharpening Shop. Send coupon or mail postcard for full details on our exclusive

30-Day FREE Trial Offer!

FREE Booklet gives full details—

Our Free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

Send for your copy today. No obligation.

No Obligation . . . No Salesman

FOLEY BELSAW

FOLEY-BELSAW CO.
60039 FIELD BLDG.
KANSAS CITY, MO. 64111

FREE BOOK

RUSH COUPON TODAY!

Please send my FREE copy of your book "Lifetime Security" and full details on your 30-Day Free Trial Offer!

Name _____

Address _____

City _____ State _____ Zip _____

GARY WITZENBURG

DETROIT LISTENING POST

GM product confusion

If you're a regular reader and a little confused about what's going on at GM, you're not alone. Given all the strange, sometimes conflicting rumors bouncing about in Detroit, I'm beginning to think that no one, from the corporate management on down, really *knows* for sure what's coming when.

Example: Because of fairly stable gas prices and the resulting resurgence in big-car demand, Cadillac Div. wants to keep its current full-size deVille (C-car) around at least through '85, despite the fact that Buick Div. and Olds Div. will be getting all-new, downsized fwd C-cars for '84.

Example: For the same reason, Chevy wants to keep its rear-drive B-car (Impala/Caprice) for a year or two after Buick and Olds versions are replaced by the smaller fwd B-cars. (Pontiac has already dropped its B-cars for '82.)

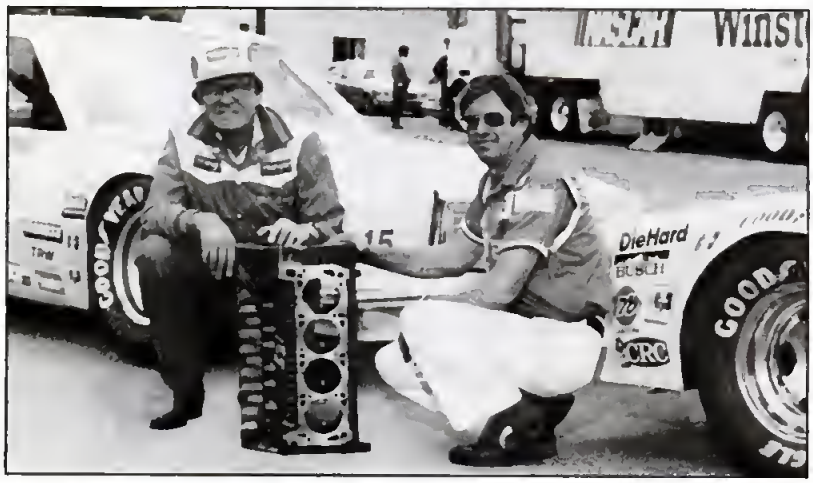
Example: Chevrolet also is lobbying for a one-year exclusive on the all-new fwd N-body, which is scheduled to replace the current G-car personal coupes (Monte Carlo, Grand Prix, Cutlass Supreme, Regal) for '85. This would mean that Pontiac, Olds and Buick would have to wait until model year 1986 for their own N-car versions.

Actually all of the Detroit Big Three are increasingly nervous about downsizing and/or discontinuing their traditional rear-drive intermediate and large cars—the same models they can hardly *give* away every time there's a panic, artificial or otherwise, in the fuel situation.

The fact that sales of such cars are on the rise once again demonstrates *again* the fickleness (and short memory) of the American car-buying public—and the extreme difficulty of planning what will go into the product lineups three and four years in advance.

Some have felt GM has acted hastily in planning to convert virtually everything it builds, except the sporty Camaro/Firebird and Corvette, to fwd by mid-decade. Now the corporation itself obviously is having second and third thoughts.

Road blocks



Bud Moore (left) and Len Wood, who field a Thunderbird in the National Assn. for Stock Car Auto Racing (NASCAR), take possession of the first newly minted 351-cu.-in. Cleveland engine block. Long out of production, the legendary Cleveland has been born again by Ford SVO (Special Vehicle Operations) and will be available to any racer with $1,195. Time to come out of the closet, Chevy?

Japanese Chevettes?

Another area of seeming confusion at General Motors has been what to do in the subcompact class below the new fwd J-cars. So far, the technically ancient rear-drive T-cars (Chevy Chevette/Pontiac 1000) have held their own reasonably well in a market segment overflowing with high-tech fwd machinery from home and abroad—mostly because they're simple, reliable and (above all) cheap to buy and run.

But it's been widely reported that a new fwd subcompact imported from GM's Japanese partner Isuzu will replace the venerable T-cars in mid-'84. *Not true.* GM has indeed contracted for delivery of some 100,000 '84-model Isuzu minis—slightly smaller than the current Ts with engines in the 1.3 to 1.5-liter range—beginning a year from next April, and another 200,000 '85s. But these are intended to *supplement* the supply of home-built subcompacts, not replace them.

GM also plans to import "well under 100,000" cars a year from motorcycle and micro-minicar builder Suzuki for '85 and beyond. These little commuters will weigh only about 1,400 pounds and be powered by an 800-cc. three-cylinder engine.

Further confusing the issue are continuing talks between GM and No. 1 Japanese carmaker Toyota. If these discussions come to anything, it will probably be a Toyota-designed subcompact built in a now-idle U.S. plant beginning in 1985 or '86. This car presumably will be shared by both companies in the U.S. market, and GM's version of *it* could well be the long-awaited T-car replacement.

Naturally the Isuzu and Suzuki deals aren't going down well with the hard-pressed UAW folks, who understandably believe that the U.S. industry's new products should be built here, not imported.

But GM insists these are only stopgap measures intended to keep its dealers viable in the econocar market until cost-competitive new domestic products can be produced—just as the Isuzu-built Chevy LUV filled GM's minitruck gap until the new S-trucks could be put into place. The compa-

(Please turn to page 26)

SATURN V

STATE-OF-THE-ART

Free movies, sports and special events with the Saturn-V deep fringe microwave receiver for homeowners outside the service area of local over-the-air pay TV stations (i.e. HBO, Showtime). The Saturn-V is a high technology microwave downconverter featuring State-of-the-Art electronics for general microwave usage. Receiving range is 65 miles line-of-sight of a local transmitting tower. The Saturn-V is the only factory direct receiver available and comes with a full 6 month warranty.

Dasign/Performance features:
• Gain 40 db • Frequency 2-2.5 Ghz • Tuning-Channels 2-6 • 20 inch Parabolic antenna • Power supply • 60 ft. cable, cable adapters, brackets and hardware included • Illustrated instructions

For authorized reception of satellite video programing.

Suggested Retail **$245.00**
Summer Special **$169.99**

ORDERS ONLY:
Call Toll Free: 1-800-824-7927.
For more information for use of the Saturn-V in your area, Call: 1-916-454-2190.

We accept Mastercard, Visa, UPS-COD. When ordering by mail, money-orders and cashiers checks only (sorry, no personal checks). Volume prices on request.

Note: Microwave receivers will not pickup cable TV or the signal from cable link towers.

Serving you today and tomorrow

Microwave and Satelite Systems

JDI Industries ™

4558 Auburn Blvd., Suite 208
Sacramento, California 95841

DETROIT LISTENING POST

(Continued from page 24)

ny's engineering staff has all sorts of baby-car prototypes running around right now but says that none of them could yet be produced in America inexpensively enough to compete with the Japanese imports.

'83½ Corvette

One thing certain at GM is the excitement being generated by pending introduction of the all-new Corvette (see artist's rendering in *GM Pulls Into The Fast Lane*, page 81, Aug. '82) now tentatively set for next March. We've talked about it before but promised to keep you current as new details come to light.

According to Chevrolet, skidpad tests on the planned optional Goodyear 255VR16 "unidirectional" tires, which have specific tread patterns for each side of the car, have recorded cornering forces as high as .95 Gs! That compares to about .83 Gs for the current state-of-the-art Camaro Z-28 and Firebird Trans Am and would easily make the new Corvette the fastest-cornering production car in the world!

Standard treads will be Goodyear Eagle GTs mounted on aerodynamic, flat-centered, cast-aluminum wheels. Suspension is independent all around with fiberglass transverse-leaf springs front and rear and a new five-link rear configuration. Wheelbase is 96 inches, and weight is kept to about 3,000 pounds with extensive use of aluminum, especially in suspension and four-wheel disc-brake components.

Ford future electronics

Ford claims world leadership in automotive electronics, and seeing what the company's microchip manipulators have come up with for '83 (see "Saturday Mechanic Looks At The '83 Fords," page 162) and what's up their sleeves for future years, that's a tough claim to dispute.

Look for electronic chassis controls—to automatically adjust ride, handling, trim height and load capacity—as early as next year on some cars. Also electronically controlled transmissions (a feature already on the '83 Renault/AMC Alliance) by '85.

But the real Buck Rogers stuff comes in the '85-'90 time frame, depending on when its ready and when Ford's marketing mavens think *we're* ready for *it:*

How about a car that listens and reacts to voice commands such as "turn off the lights," "turn on the wipers," or "raise the antenna"? They already have a test Continental rigged to do these things, and we've seen it work.

How about a car that responds to a hand-held transmitter (like a TV-set remote-control) to let you lock or unlock the doors, open the trunk, flash the lights, blow the horn or set off an alarm from inside your home or office or across a parking lot? You could even use it to locate the car when you've forgotten where you left it. The current prototype system works fine but is limited to about 200 feet in range. A refined version could be available in two years.

And how about a satellite navigation system that can pinpoint your car to within 1,000 feet anywhere in North America and display its location on a little TV screen on the upper console? Preprogrammed electronic maps would be used to guide you to any location. The screen also displays the status of remote-located entertainment and heater/AC systems and has touch controls to change or tune them. You have to see it to believe it! PM

SOFTHEAT®

ELECTRIC CIRCULATING HOT-WATER HEAT WITHOUT PLUMBING

The SOFTHEAT system lets you control each room's heat individually—the best heating cost control you can have. But safety and comfort are outstanding advantages, too. Hot-water heat is clean, doesn't dry the air. Warmth is spread evenly by convection—no noisy blowers. Thermostatically controlled, with many safety features. It's the heater you can live with.

INTERTHERM®

In Canada, call Greg Lund Products, Ltd., 416-845-7558

FREE HEATING ANALYSIS
For permanent installations. Just send us your home plans.

Mail to:
INTERTHERM INC.
Dept. PM-1082
10820 Sunset Office Drive
St. Louis, MO 63127

Tell me more about SOFTHEAT:
☐ Portable units
☐ Permanent units. ☐ I include floor plan for free whole-house analysis.

NAME
ADDRESS
CITY
STATE ZIP

9-14-82

Get more clock for less money!

120-K SOLID 3/4" BLACK WALNUT

Model 120-K
Solid 3/4" Black Walnut
74"(H) x 16¼"(W) x 10"(D)

Build Emperor Clock Company's Model 120-K Do-It-Yourself Case Kit.

159.50* Factory Direct Sale Price

Regularly $219.50 Movement Extra Compare your finished clock to those retailing at up to $850.00.

The best quality at the lowest price.

Emperor Clock Company can offer you the best quality for the lowest prices because we're the world's largest manufacturer of grandfather clock kits. We volume-purchase only the finest solid hardwoods and cut each piece in our own woodworking factory. Now, for a very limited time, you can build our most popular model, the 120-K in solid 3/4" black walnut for $60.00 less than normal! Order yours today and get more clock for less money.

A pleasure to build.

Thanks to Emperor's easy how-to instructions and quality kit pieces, do-it-yourself is a rare pleasure — even if you're a beginner. Each kit piece is accurately pre-cut and sanded smooth. All miters, mortises and tenons are pre-cut. (If you prefer, your kit may be ordered unmitered for $10.00 less.) The divided swan neck and finial, waist and dial face doors, dial frame and sculptured basefront are pre-assembled. Complete instructions, all screws and hardware included. Glass is not included due to possible breakage in shipment. Each piece may be reordered separately.

SOLID BRASS EMPEROR MOVEMENTS AND DIALS

Self-Adjusting • One Week • Weight Driven • Westminster Chimes

Emperor's Model 101-M movement with dial is made of solid brass by a well-known West German family firm. Choose from either Tempus Fugit (Time Flies) or Moving Moon with lunar calendar. Both movements are self-adjusting to tick smoothly and accurately so you never have to level your clock. They sound the Westminster Chimes each quarter-hour and count the hour with a Big Ben tone. Movements include weights, solid brass weight shells, brass finished bob, pendulum and chimes. All plates are solid brass with pinions of hardened steel. Installation and adjustment are simple, following step-by-step instructions supplied.

LYRE PENDULUM WITH SOLID BRASS RODS NOW AVAILABLE $25.00 EXTRA

NO RISK!
MONEY BACK GUARANTEE
If for any reason you are not completely satisfied, return in original shipping carton within thirty days for prompt refund. No questions. No excuses.

MOVEMENTS CARRY A ONE YEAR WARRANTY

***Subtract $10 for unmitered kit**

ORDER NOW IN TIME FOR CHRISTMAS • SALE ENDS DECEMBER 31, 1982

ORDER DIRECT WITH THIS FORM • ORDERS SHIPPED 2 TO 3 WEEKS • SHIPPING CHARGES COLLECT

EMPEROR CLOCK COMPANY, Dept. 39-P Emperor Industrial Park, Fairhope, AL 36532
Credit Card Telephone Orders Welcome **Call 1 205 928-2316**
Please Check: New Customer ☐ Previous Customer ☐

QTY.	DESCRIPTION	WT.	REG. PRICE	SALE	EXTENSION
	Model 120-K Solid 3/4" Black Walnut Do-It-Yourself Case Kit (Movement Priced Separately Below)	51	$219.50	$159.50	
	Model 120-A Solid 3/4" Black Walnut Completely Finished Clock with Self-Adjusting Movement, Tempus Fugit Dial, Westminster Chimes	98	$744.50		
	Model 120-A Solid 3/4" Black Walnut Completely Finished Clock with Self-Adjusting Movement, Moving Moon Dial, Westminster Chimes	97	$759.50		
	Model 101-M Self-Adjusting Movement Complete with Tempus Fugit Dial, Westminster Chimes for Model 120-K	33	$144.50		
	Model 101-M Self-Adjusting Movement Complete with Moving Moon Dial, Westminster Chimes for Model 120-K	33	$159.50		
	Lyre Pendulum for Both Model 101-M Movements	4	$ 25.00		

We accept personal checks
Enclosed $_____ ( ) Check ( ) Money Order
Charge to my ( ) MasterCard ( ) Visa
ACCOUNT NUMBER

MasterCard Inter Bank No (above your name) — Expiration date required — No — Yr

Please ship this order:
☐ UPS ☐ PARCEL POST ☐ MOTOR FREIGHT
Emperor reserves the right to select method of shipment, if necessary

☐ **Please send free color brochure.**

Please check.
☐ Send Kit Unmitered Subtract $10 From Total

TOTAL $_____
Alabama residents only, add 4% sales tax $_____
GRAND TOTAL $_____

SHIP TO:
NAME _____
ADDRESS _____
CITY, STATE, ZIP _____
TELEPHONE NUMBER _____
(PLEASE PRINT)

EMPEROR® CLOCK COMPANY
WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS
©1982 Emperor Clock Company
All Rights Reserved

MasterCard VISA

VISIT OUR FACTORY SHOWROOMS MONDAY-SATURDAY, EMPERDR INDUSTRIAL PARK, FAIRHOPE, AL

BILL McKEOWN

ALL OUTDOORS

Testing the testers

Though it is always a good idea, it's not always possible to try out personally every product you buy. When the dealer lets you steer a boat around the harbor, you get a quick idea if it will run, but that still doesn't show for sure if it will be fun and worth the money. That's why PM editors prepare detailed test reports: so you can get an evaluation of what expert drivers and crew have found.

Some measurements are personal and subjective, but are also factors that determine if the product is worth the price. So every so often, we like to turn users into testers to see how *they* feel about various craft.

Recently in Detroit, at the noted Grosse Pointe Yacht Club, we got several hundred friends together to try out some of the latest in power and sail. We wanted to see how both beginners and experienced boating people would enjoy activities as varied as new surf-sailing and jet-skiing, and as time-tested as day cruising in an antique-type runabout or a big sailing ketch. Included in PM's fleet were a handsome Grand Craft Speedboat reproduction of a 1931 Chris-Craft, a Pearson 365 sloop, Silverton 34 cabin cruiser, Formosa 51 ketch, a Mako 25 with twin Evinrudes, a Yar-Craft runabout using Johnson outboards, OMC sterndrives on a 4 Winns runabout, Grumman 5-Meter with Suzuki outboard, plus Bic sailboards, Kawasaki Jet Skis, Surf Jets and Wetbikes.

Testers found the Grand Craft Speedboat replica a pleasure to ride and drive.

Mako fishing utility (foreground) and Formosa ketch gave power/sail tests.

For getting the feel of sailboarding, Bic boardsail simulators give a head start.

With Jet Ski instruction given first ashore and then afloat, the sport proved easy.

What our enthusiastic, life-jacketed test team showed was that power and sail pleasure boating are equally popular, when available; good instruction is the key to getting well started at board sailing and jet-skiing; larger craft are worth their size on a blustery day; comfortable accommodations have more appeal than all-out speed; and boating can be among the most satisfying of pastimes.

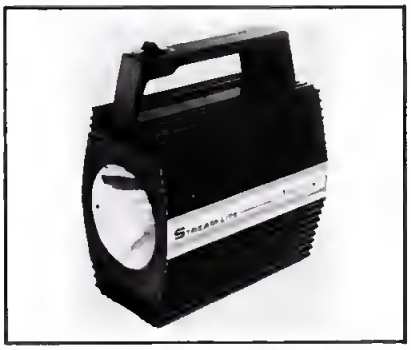
Sailboarding ashore

Boardsailors can bring their sails and skills onto a flat beach or parking lot with the $700 Landsailer, imported from England by Windsurfing International, 1955 West 190th St., Torrance, Calif. Speeds up to 50 mph have been reported, using the sail and rig from a standard sailboard.

Dry-land sailing using the rig from a sailboard is possible with a Landsailer.

High power—high price

A flashlight that may be the world's strongest and most expensive is made by Streamlight Inc., 1030 West Germantown Pike, Norristown, Pa. It's about $475, and operates off a 12-volt car or boat battery or a $150 rechargeable pack. But the Streamlight/1 Million is said to light a newspaper for reading seven miles away. PM



Beam of Streamlight/1 Million is said to almost blind intruders at 500 yards.

If you're into labels,
only the best will do.
IMPORTED
"Canadian Club"
Blended Canadian Whisky
Distilled and Bottled under
Canadian Government Supervision by
Hiram Walker & Sons.
Limited
Walkerville, Ontario, Canada.
THIS WHISKY IS 6 YEARS OLD
86.8 US PROOF
Canadian Club®
"The Best In The House"®
86.8 Proof. Blended Canadian Whisky. Imported in Bottle by Hiram Walker Importers Inc., Detroit, Mich. © 1982

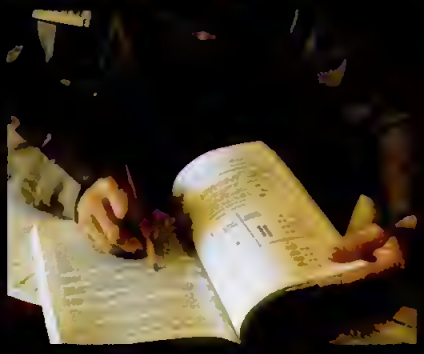
Did you know the Services have the means to teach someone still in their teens.

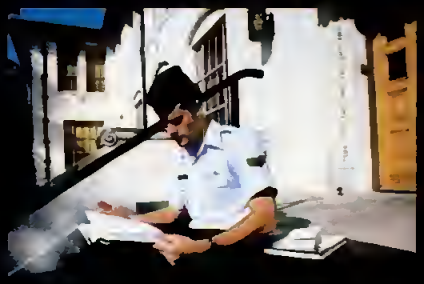
Need a trade? Looking for a skill? They have hundreds that'll fit the bill.

They'll take you, train you, show you the way. You'll work hard, and get decent pay.

ARMY NAVY AIR FORCE MARINES

Serving your country is a really good start. Helping pay for college is the Services' part.





Future in doubt? Well, shed that lead, join the Services and get ahead. In the Army, Navy, Air Force, Marines.

If you're bright enough to graduate from high school and are looking for an opportunity to better yourself—you'll find it in the Army, Navy, Air Force and Marines.

For instance, if you want to become an expert in a highly technical field, the Services are the place to learn. You'll work with some of the latest and most sophisticated equipment available. And your instructors are second to none.

Actually, there are hundreds of valuable career skills you may qualify for. And experience isn't important. If you don't have any, they'll see that you get it. The important thing is—you'll be building for your future.

Interested in education? Whether it's college, vocational or technical training, the Armed Forces can help. There's even a program in which the government contributes money toward your college education after the Service.

And when it comes to benefits—it's tough to beat the Services. Pay is higher than ever—more than $550 a month to start. And you earn 30 days of vacation each year.

To find out more, see your local Armed Forces recruiter or write Armed Forces Opportunities, P.O. Box C 1776, Huntington Station, N.Y. 11746.

IT'S A GREAT PLACE TO START

There's only one way to play it...

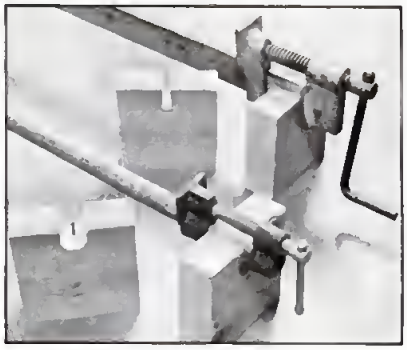
Kings, 2 mg. "tar", 0.3 mg. nicotine;
100's, 5 mg. "tar", 0.6 mg. nicotine
av. per cigarette by FTC method.

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

©1982 B&W TCO

HINTS FROM READERS

Clamp holders



These holders, cut from a 2×6, can support bar or pipe clamps so your hands are free to glue and arrange parts. The holders allow the clamp handle to be turned freely as you tighten the clamp. The holders are made of 1½ × 4½ × 4½-in. stock. To make one, cut a slot slightly larger than the clamp bar or pipe into one edge. If you're using the blocks with pipe clamps, hammer a 2-in. finishing nail so it projects ½ in. from the rounded slot, as shown. Then bore a small hole in the pipe clamp to receive the nail. The hole in the clamp goes over the nail to keep the clamp from rolling.—*Robert J. Gurrero*

Restore a carrying case

For a quick way to repair scuffed areas on a typewriter or similar case, follow these three simple steps: First, spread white (wood) glue over the scuffed spots and under the edges of any loose covering material; smooth the glue with a spatula or similar flat tool. Let the glue stand overnight; then sand smooth any high spots. Second, color the glue-sealed areas with a felt-tipped marker of the appropriate color. Third, apply shoe polish of the same color to the entire surface and buff if needed. Use a flexible adhesive if the repaired area is likely to be flexed.

—*Walter E. Burton*

PM PHOTO HINTS

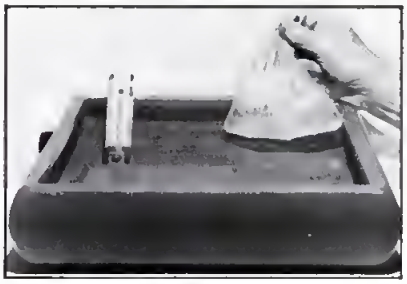
Jaws

Plastic tongs are great, but what can you use as a backup when they break? I found a wooden clothespin, the kind with a spring, holds wet prints securely.—*Robert Hertzberg*

Borderless prints

To make borderless prints on an enlarger's easel, adjust the hold-down guides to fit snugly around print paper, without overlapping edges. From under each corner, attach a strip of masking tape, sticky side up, to hold the paper fast.—*Louis Hochman*

Temperature tamer



Keep solutions at the right temperature with hot water or ice cubes in a plastic bag that's closed tightly with a rubber band. It's quick and contamination-free.—*Robert Hertzberg*

KOOL ULTRA

No other ultra brings you a sensation this refreshing. Even at 2 mg., Kool Ultra has taste that outplays them all.

Kings, 2 mg. "tar", 0.3 mg. nicot
100's, 5 mg. "tar", 0.6 mg. nicotin
av. per cigarette by FTC meth

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

© 1982 B&W T Co.

McCULLOCH CURES SPLITTING HEADACHES.

Our new Woodmate I.™ A logsplitter that's half the size and half the price of comparable gas powered logsplitters.

$499.99

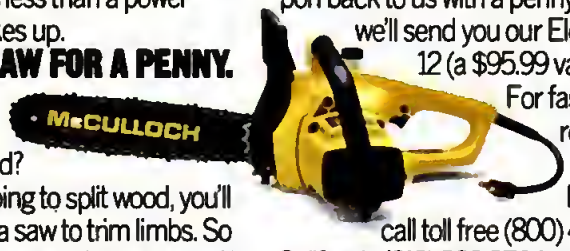
This electric brute packs 10 tons of hydraulic splitting power. So it can split a cord of oak in just 2 hours. For about 15¢ worth of electricity.

The Woodmate I weighs only 115 lbs. Rolls easily thanks to its dolly-like design. And stores in only 2 square feet of floor space, which is less than a power lawnmower takes up.

GET A SAW FOR A PENNY.

But what about your wood?

If you're going to split wood, you'll certainly need a saw to trim limbs. So when you buy our new logsplitter we'll give you a coupon for a McCulloch electric chain saw. Just send the coupon back to us with a penny, and we'll send you our Electramac 12 (a $95.99 value).



For fast, fast, fast relief from splitting headaches, call toll free (800) 423-6302. In California (213) 822-9724 collect for the name of your nearest McCulloch dealer.

How To Pick The Right Fastener For The Job

The small sampling of fasteners and accessories above shows just a few of the items that can be used to join objects together.

PM offers tips on the many varieties of not-so-common nails, as well as a host of other fasteners.

by William Beyer and David A. Warren

Whether it's reshingling a roof, fastening a plate-glass mirror to a wall or hanging a lightweight kitchen utensil to the range hood, we're confronted with problems of fastening items in place on a daily basis. Knowing what fasteners are available, from the modern hook-and-loop products to the centuries-old common nail, will help in selecting the best fastener for a specific job.

The nail, for example, is not so common anymore. It has become specialized, with a different type for every conceivable use (see *Types of Nails And Their Uses*, right).

Nail points are shaped to suit spe-

TYPES OF NAILS AND THEIR USES

Common nail: general purpose nail; used for construction and carpentry.

Box nail: lighter than the common nail; joins a thin piece of wood to a thick one, as in box construction.

Duplex head nail: temporary holder; it's driven the depth of lower head, leaving upper head projecting for removal.

Concrete nail: hardened shaft; fastens furring strips and sole plates to concrete.

Roofing nail: large, roundhead, galvanized nail; holds roofing materials. Some have a lead or rubber washer for a watertight seal on metal roofing material.

Finishing nail: slim head that can be set and filled over; used for cabinetmaking and holding house trim in place.

Casing nail: looks like a finishing nail, but with a slim, tapered head. Used on casing around doors where holding strength and invisibility are needed.

Cut flooring nail: long, thin, rectangular nail; used to blind-nail flooring through edges without splitting.

Spiral nail: for tight flooring joints. Tends to turn like a screw when driven; more commonly used than cut nail.

Siding nail: aluminum, to prevent rusting; available in colors to match siding.

Paneling nail: hard, thin and ribbed; colored to match paneling shades.

Capped nail: spiral-shank nail with a metal or plastic cap about 1 in. square; used for applying insulation sheathing to a new home before siding.

Common brad: small, wire nails of uniform thickness with a small head; used to nail parquet flooring, and attach moldings to furniture. It's usually sunk end filled.

Barbed dowel pin: looks like a headless nail, but with a barbed shank; used as a pivot, to align parts and to join things to be separated later.

Upholstery nail: large, decorative, umbrella-shaped head; used to attach upholstery fabrics where nails will show.

Tack: used to hold carpeting or upholstery fabrics in out-of-view places.

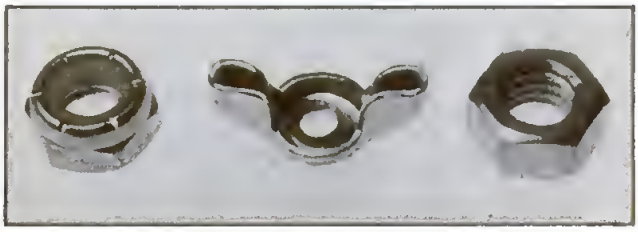
Staple: U-shaped nail; used to hold wire or screening. Some have insulated shoulders for holding electrical wiring.

Steel corrugated nail: often called a "wiggle" nail; used by furniture makers to strengthen a glued joint made by two edge-joined surfaces in the same plane.

Scotch connector: wasp-shaped bar with four pointed nails on either side of the bar which straddles a joint.

The lagscrew (left) is used in heavy construction. It and the two adjacent screws are wood screws. The remaining two screws with coarser threads are intended for use in metal.

Heads of these screws are (from left): cross-slotted Phillips, oval, round, flat and panhead. Oval heads are partially countersunk into a surface; flatheads are driven flush (fully countersunk).



Three common nuts used with bolts are (from the left): locknut, wingnut and hexnut. The locknut, which is similar to the hexnut in its hexagonal shape, has a nylon insert which locks onto the threads of a bolt. The wingnut is used in situations where a nut must be loosened and tightened frequently by hand. Both the hexnut and locknut must be wrench-tightened.

Three common washers used with nuts are (from the left): flat washer, internal-tooth lock washer and split lock washer. A flat washer tends to turn as the nut is turned, aiding loosening or tightening. The internal-tooth lock washer is often used with a wingnut to keep it tight. The split washer presses against the metal which also serves to hold a nut tight.

The three most common bolts you'll find in hardware stores are (bottom to top): the machine screw, available in smaller sizes; the carriage bolt, which has a square shoulder under its head; and the hexbolt, which is found in larger sizes.

TYPES OF SCREW HEADS AND THEIR USES

Flat: a popular type; head can be counterbored and hole filled with wood putty to conceal head.
Oval: can be countersunk, but is generally left with rounded top surface showing.
Round: commonly used; left fully exposed as a decorative element.
Fillister: shaped like stacked checkers so that it can be countersunk easily.
Pan: looks like an upside-down frying pan, narrower at the top and flat on top and bottom.
Truss: thin, wide head.
Headless screw: has a slot cut into the shank; can be countersunk easily.
Lentil: cylindrical head.
Binding: round on top with slightly tapered sides.
Hex (six-sided) and **square:** found on lagscrews; turned with a wrench.
Dowel screw: no head; has a point and screw threads on both ends.

cific jobs. Point types are: needle, diamond, chisel, blunt and cut. The last is used for masonry. A sharp point facilitates penetration. However, the duller the point the less chance you have of splitting the material. This is because a blunt nail cuts down through the material (wood fibers) instead of wedging its way through. That's why blunt-pointed nails are used for flooring and wood shingles. However, blunt nails have less holding power than sharp ones.

A nail's holding power also varies with the amount of surface area in contact with the wood. A square-shank nail, for example, will hold better than a round one because it has more outside area. Grooved, spiraled and barbed nail shanks are designed for greater holding power, too. Shanks can also be etched or coated to increase holding power.

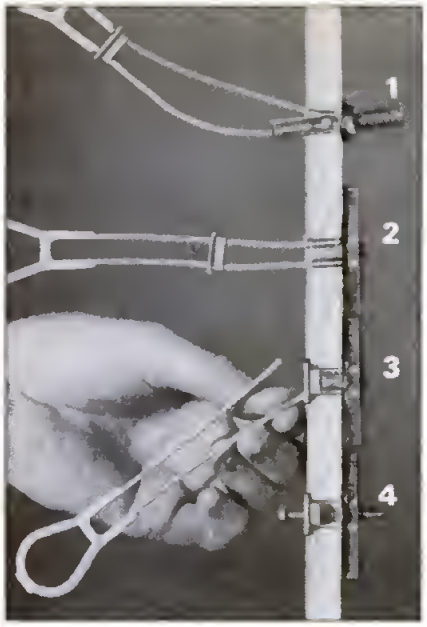
Powered nail drivers are becoming commonplace, especially when there is a need to drive a number of nails into concrete. The tool utilizes a shell, loaded with gunpowder, and it "shoots" a casehardened nail into the concrete.

Staples can also be driven in rapid succession. Some hand staplers used in upholstering, for example, are spring-loaded to drive a staple when the spring is released. The hammer staplers used in roofing drive a single staple with each blow. For homeowners, there are hand- and electric-powered staplers to choose from.

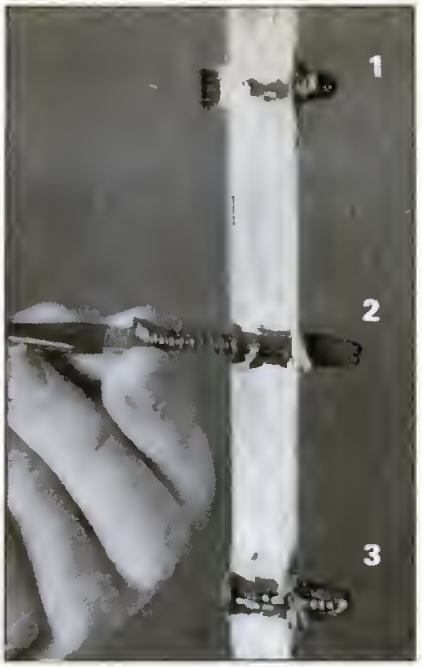
Rivets are helpful fasteners for joining sheet-metal parts, such as radiator-cover sections. Rivet tools for odd jobs are available with special rivets that can be applied entirely from one side. These rivets come in sizes up to ¼-in. dia. and ⅝-in. grip range (thickness of materials being joined). You must predrill a hole for the rivet before installing it.

All screws are either wood screws or sheet-metal screws. Some of the materials used to make screws include steel, brass, stainless steel and aluminum.

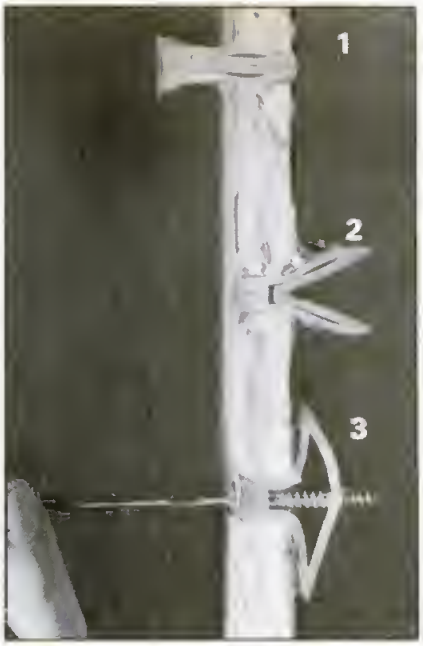
Screw heads are either single-slotted and tightened by conventional screwdrivers, or cross-slotted and



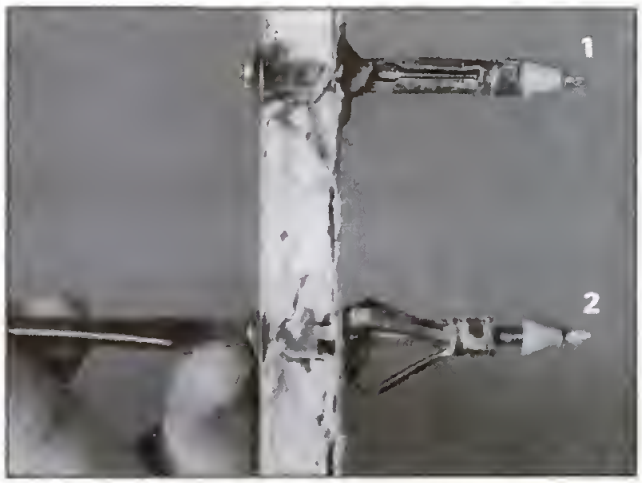
This metal U-channel system from Mechanical Plastics holds heavy items. Push the channel through a bored hole (1) and pull back to position. Slide the washer-sleeve along a racheted strip (2). When sleeve is in the hole, snap off strip at the sleeve (3). Finally, install the fastener (4).



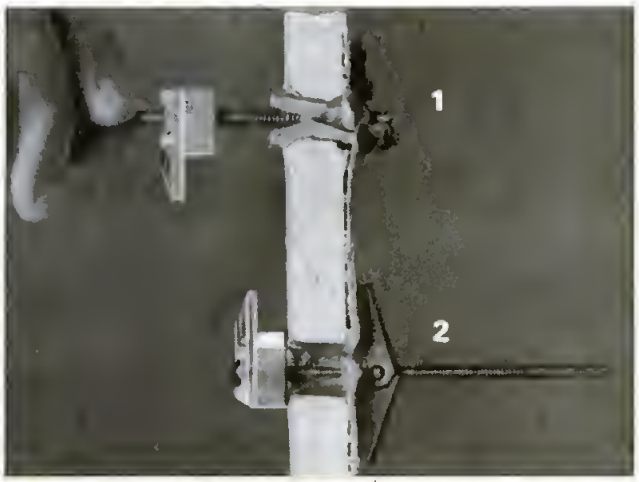
Plastic wall anchors work effectively in plasterboard and paneling. Bore a hole and tap in the anchor (1). Turn a screw into the anchor (2). The screw forces the anchor to expand, ensuring a tight fit (3).



The Toggler, manufactured by Mechanical Plastics, folds to pass through a hole bored in plasterboard (1). An accompanying pin poked through the hole forces the fastener to expand (2). It will hold a screw and other item firmly in place (3).



Expansion bolts are commonly used to anchor heavy items to hollow walls. The ones shown from Stanley Hardware are driven into the wall with a hammer (1). To use other types, you must bore a hole first. As the bolt is turned, the slotted shield (legs) expands (2) and presses against the back of the wall.



The sprung-wing toggle bolt is another fastener that holds heavy items to hollow walls. Remember to attach the item you are mounting *before* you put the toggle into the wall (1). Once inside the wall, the wings spring open (2). There's no way to remove the bolt without losing the toggle inside the wall.

tightened by Phillips screwdrivers to permit maximum driving pressure. Thumbscrews, on the other hand, have enlarged, flattened heads; you can turn them between your thumb and forefinger.

Nuts and bolts

Nuts, bolts and washers are generally used for fastening metal parts together. Machine screws or bolts, as they are called, fall into this category, along with carriage and stove bolts.

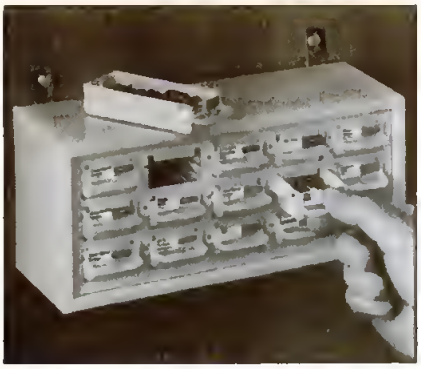
Carriage bolts have large, rounded heads and square shoulders underneath. The shoulder fits a square hole and keeps the bolt from turning as the nut is drawn up. Stove bolts are made with slotted heads, either round, flat or oval.

Nuts come in two basic shapes, hexagonal and square. A cap nut, covering the end of a bolt and used in situations where the end is visible, is a variation on the hexagonal shape. Two nuts with exceptional shapes are the wingnut, which has two flat protrusions for hand-turning, and the knurled nut, which is cylindrical and knurled for tight gripping.

Another nut, the castle nut, has one end which looks like a castle rampart. It's used with a cotter pin which locks it onto a drilled bolt. A locknut has a nylon gripper fitted into one end through which the bolt passes.

Washers serve several purposes. A flat washer eases tightening and lock washers add an extra measure of holding power.

There are three types of lock washers: a spring-lock split washer, which resembles one turn of a spiral; an internal-tooth washer, which has teeth around the inside of the hole; and the external-tooth washer. This



Hang Stanley's hardware cabinet on a wall or place it on a table. The cabinet holds packs of Stanley fasteners sold individually in hardware stores. Each pack is held securely, yet glides out easily.

Adhesive-backed Velcro squares are used to fasten light items, such as a flashlight, within easy reach. Apply the hooked Velcro to the wall, the looped material to the item. Press the two together (inset) and the object remains in place until you need it.

last type is best because the teeth are farther from the bolt shank and can withstand greater torque.

Wall and ceiling fasteners

Anchors and toggles help screws and bolts hold things to walls and ceilings. Wall anchors are plastic, fiber, nylon, lead or zinc. As a lag-screw is turned into the anchor, it expands and presses against the hole bored in the wall. Lead and zinc are generally used in masonry walls. Plastic anchors are good, general-purpose wall anchors for paneling and plasterboard.

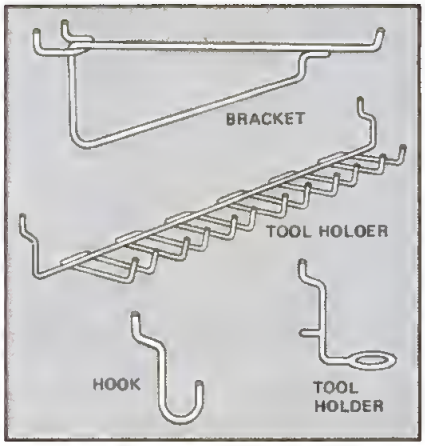
If the object to be attached is heavy, use a toggle system. Traditional toggle bolts have metal sprung wings that thread onto the bolt. The wings fold to pass through the bored hole and into the hollow of the wall. There they spring open and press against the back side of the wall as the screw is tightened.

An expansion bolt, often called a Molly (Bostik's trade name), is another type of wall anchor. As the bolt is turned, an outer metal cylinder expands in the hollow of the wall to grip the wallboard. These bolts are designed for specific wallboard thicknesses. There are two kinds of expansion bolts. One requires that you bore a hole through the wallboard; the other has a sharp pointed tip that you drive into the wall.

Hooks, screw eyes and hanger bolts form still another category.

Hanger bolts, which have screw threads at one end and bolt threads at the other, can be completely or partially concealed. When used on ceilings, hooks and eyes must be threaded into a joist or toggle system. Plasterboard alone isn't strong enough to hold much weight.

A Velcro strap is an ideal way to hang an often-used extension cord or other small objects. The strap tab is adhesive-backed. For heavier items, the tab has a hole for a nail, screw or other fastener.



This system of metal holders and perforated board helps organize a work area (left). Holders can be removed and repositioned quickly as needed. We nailed 1×2 wood strips between the board and wall to provide space for inserting the holders.

Other fastening systems

Hook-and-loop materials are among the easiest fasteners to use. You can purchase adhesive-backed squares and strips of the materials at hardware stores under the brand name Velcro. There are two parts to the fastener: a material of tiny loops and one of microscopic hooks. When touched together, the hooks snag into the loops.

You could easily spend a small fortune in fasteners. However, here's a helpful rule you can apply when buying an assortment of wood screws: Multiply the screw number by ¼ to find a useful length of that size. (The screw number refers to diameter.) For example, a common length of a No. 2 screw is ½ in. (2 × ¼ = ½). Following this rule, you'll get an assortment of convenient-length screws of different diameters. **PM**

MANUFACTURERS LIST

Assembly Fasteners Inc., 6955 North Hamlin, Lincolnwood, Ill. 60645 (nylon insert locknuts; standard bolts; screws and nails in steel, brass, bronze, stainless steel).

Bostik Consumer Div., USM Corp., 4408 Pottsville Pike, Reading, Pa. 19605 (Pop rivets, Molly fasteners, staples).

D.R.I. Industries Inc., Box 20612, Bloomington, Minn. 55420 (full line of fasteners and compartmented organizers).

Masonite Corp., Bellwood Products, 2601 Grant Ave., Bellwood, Ill. 60104 (Peg-Board).

Maze Nail Div., W.H. Maze Co., 100 Church St., Peru, Ill. 61354 (specialty nails: zinc-coated, ring and spiral shanks, painted and tempered).

Mechanical Plastics Corp., Box 328, Pleasantville, N.Y. 10570 (screw anchors and toggle bolts).

National Nail Corp., 2964 Clydon, S.W., Grand Rapids, Mich. 49509 (specialties, such as plastic-cap insulation nails)

Northwestern Steel & Wire Co., 121 Wallace St., Sterling, Ill. 61081 (standard, galvanized and cement-coated nails and staples).

Stanley Hardware Div., The Stanley Works, New Britain, Conn. 06050 (full line of fasteners).

Tremont Nail Co., Box 111, Wareham, Mass. 02571 (old-fashioned cut nails).

Velcro U.S.A. Inc., 521 Fifth Ave., New York, N.Y. 10175 (Velcro hook and loop system).

New from NRI!

The first at-home training in videocassette recorder repair with exclusive videotaped lessons.

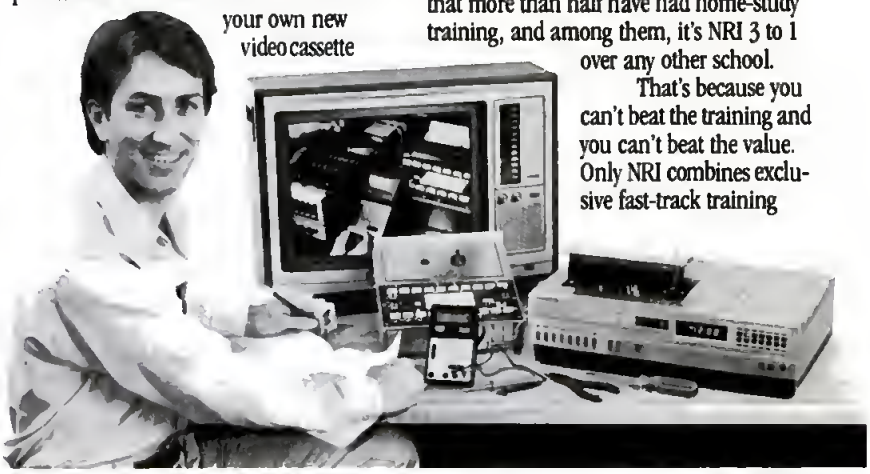
Learn TV/Audio/Video Servicing...includes state-of-the-art VCR, NRI Action Video lessons, plus full training in color TV and audio repair.

Now, you can learn the hottest, most wanted skill in home entertainment electronics...servicing and repairing videocassette recorders and video disc players. Well over 2 million units have already been sold and the demand is just starting! Already, qualified VCR technicians are in short supply...people are waiting up to a month for VCR repair. Good jobs at good pay are going begging. And NRI can get you in on the action with convenient and effective at-home training.

Choice of Specialized Training

NRI offers you three Master Courses in TV/Audio/Video Servicing, each complete, each with equipment and training for the specialty you want. Each course thoroughly prepares you for color TV plus audio and video equipment. Then, you take the specialized hands-on training on the equipment you select.

You can get specialized audio experience as you build your own AM/FM stereo system complete with speakers. Or gain real bench experience with hands-on TV training as you build a 25" (diagonal) fully computerized, programmable color TV and professional test instruments. Or train with your own new video cassette recorder and NRI's exclusive Action Video servicing lessons on videotape.



Specialized training on Heath/Zenith Model 2501 25" (diagonal) color TV, videocassette recorder, or AM/FM stereo you keep for yourself.

State-of-the-Art VCR

This modern VCR features high-technology design with electronic pushbutton tuning, remote control, three recording speeds with up to 6-hour capacity, high-speed visual search, built-in clock/timer, memory rewind and audio dubbing capability. Direct drive motors and azimuth recording give outstanding picture reproduction.

It's yours to keep, as part of your training. You'll not only use it to learn operation and servicing techniques, but to play the absorbing NRI Action Video lessons that come as part of your specialized training. In word and picture, you'll learn theory, construction, and service procedures, see them explained in graphic closeups. And you get this unique training only with NRI!

Learn at Home at Your Convenience

No need to quit your job or tie up your evenings at night school. No time away from your family or expensive travel. NRI comes to you. You are a class of one, getting both theory and practical hands-on training backed up by our staff of experienced educators.

NRI the Pros' Choice

More than 67 years and a million and a half students later, NRI is still the first choice in home-study schools. A national survey of successful TV repairmen shows that more than half have had home-study training, and among them, it's NRI 3 to 1 over any other school.

That's because you can't beat the training and you can't beat the value. Only NRI combines exclusive fast-track training techniques with modern state-of-the-art equipment to give you the skills you need for success quickly and easily. Only NRI offers such complete training with so many timely options for specialized bench experience. Send for our free catalog and get all the facts on these exciting Master Courses in TV/Audio/Video servicing.

Free Catalog... No Salesman Will Call

Mail the coupon today for your free copy of our 100-page look into tomorrow. It shows all the equipment you get, describes each lesson in detail. And it tells you about other important career opportunities in Microcomputers and Microprocessors, Digital and Communications Electronics, Electronic Design Technology, and more. Send today and get started on a big new future for yourself. If card has been removed, please write to us.

NRI SCHOOLS
McGraw-Hill Continuing Education Center
3939 Wisconsin Ave.,
Washington, D.C. 20016

We'll give you tomorrow.

Autosound Sale!
Save $60

Display Dimmer | Locking Rewind | Stereo/ Mono | Auto Eject | Locking Fast Forward | Manual Eject And Clock Display

33% Off Our AM/FM Stereo Cassette With Digital Frequency Display/Clock

Easy Do-It-Yourself Installation—Includes Both a Trim Plate for In-Dash Mounting and a Nosepiece for Under-Dash Use. Shafts Adjust From 5 1/8 to 6 5/16" (130 to 160mm).

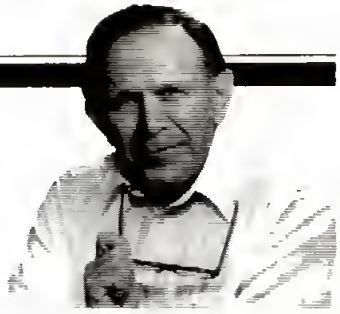
Enjoy great listening with this sensational autosound value! Now you can get our Realistic® AM/FM stereo cassette with LED digital station frequency and time display at one-third off our regular low price of 179.95. Designed for mounting in dash of most domestic mid or full-size cars, mounts conveniently under dash in others. Built-in quartz clock displays the time when playing cassette or when radio is off, shows exact station frequency when listening to the radio. Delivers great sound with 14 watts total output. Locking fast forward and rewind help you find tape selections quickly. Cassette ejects automatically at end of tape in all modes or when ignition is turned off. Also has electronic manual eject. Size: 7 × 1 3/4 × 5 1/8" (178 × 44 × 130mm). Nosepiece: 4 1/8 1 3/4 × 1 3/8" (105 × 44 × 35mm). Hurry in and save! #12-1889. Now only 129.95. Sale ends Oct. 31, 1982.

Radio Shack®
A DIVISION OF TANDY CORPORATION

Retail price may vary at individual stores and dealers

JOHN GAYNOR

HOMEOWNERS' CLINIC



Venting a shop gas heater

My workshop is in a separate 20 × 24-ft. building which I now heat with a woodburning stove. Because I sometimes need instant heat, I am switching to a gas heater. Is there any danger from fire or explosion because of the open flame and the high amounts of sawdust?—David C. Cerri, Mishawaka, Ind.

With just the right proportion of air and sawdust, there is a very slight chance of explosion. Also, the heater's jets could become clogged when the heater is not in use. Through-the-wall heaters are available that are vented to, and obtain their combustion air from, outdoors. Consult your local gas utility for more data.

Latex over oil-base paint

We have been living in our house more than eight years. The doors and moldings were painted originally in an oil-base paint; a few years later, we painted them with a water-base paint. In a few months, the paint began to chip off. We've tried repainting, but it still flakes off. What do you suggest?—J. Nerenstein, Sherman Oaks, Calif.

According to my Sherwin Williams paint-chemist friend, you've got your work cut out for you. The pro says to remove the latex completely, which probably means stripping the entire door and trim. You could then repaint with oil-base paint over a good oil-base primer.

If you're certain that parts of the water-base paint have adhered completely, you can "rough up" the surface with fine sandpaper and then repaint with oil-base paint. Beware of this seemingly easier method, though, since the latex could still flake off at a later date.

Sealing out house gas

I read a news report stating that the U.S. Consumer Product Safety Commission (CPSC) has banned the use of urea-formaldehyde foam insulation (UFFI). That news item also mentioned that a small disc could be used to test for formaldehyde vapor.

The hundreds of thousands of us who had our walls and basements sprayed with this material need to know where to get this test item, and what to do if we have the vapor. Would you seal the walls with shellac or varnish, or is there another remedy?—W.G. Penrod, Bozeman, Mont.

If my home were insulated with UFFI, I wouldn't panic, but I would take some precautions. The CPSC states, "In many homes, there is a low level of offgassing of formaldehyde: therefore, the risk of injury to people living in these homes is reduced."

Even if you do have what is considered a *high* level of offgassing, there are ways to keep the gases from entering your living quarters. People vary in their susceptibility to formaldehyde. A "dangerous" (high) level may not harm a healthy person, while an "acceptable level" may be detrimental to individuals with past medical problems.

***Materials that may be used to seal your home against possible formaldehyde gas are, left to right:** water-resistant duct tape, low-permeance paint, caulk, joint compound and tape, and switch-plate gaskets. Vinyl wall covering also helps.*

To solve the problem of formaldehyde vapor in your house, first determine the vapor level. Under "laboratories" in your classified directory, you will find the names of companies who will make this test. Tell them you want to determine the concentrations of formaldehyde in the air.

The preferred method of testing is the chromotropic acid procedure recommended by the National Institute of Occupational Safety and Health. The cost for this may vary from $50 to $500, depending upon the extent of the testing.

For a much less expensive method of determining vapor level, you can purchase a monitor and perform the test yourself. The 3M Co., Box 43157, St. Paul, Minn. 55164, among others, manufactures a monitor about the size of a half-dollar; it costs $35 postpaid. Complete instructions are sent with the monitor. Basically, you open the sealed sack, clip the monitor to a lampshade (or other object) for 24 hours, reseal the monitor and mail it back to 3M.

Allow 7 to 10 days for shipping and 5 days in 3M's lab. The results are mailed back to you, listing the presence of formaldehyde in parts per million. Your physician or Public Health Dept. can interpret the results.

After you've determined the vapor level, you can use various aids to seal your living space from formaldehyde gases as shown in the photo at left. Essentially, you want to create an "envelope," separating your living quarters from the foam.

To seal off the vapor, fill all holes or gaps in the wall finish with joint compound or caulking. Remove baseboards and caulk the junction where the floor meets the wall. Caulk or spackle the space under the window and door trim where the plaster or wallboard falls short of the jambs. Install inexpensive gaskets, available from hardware stores, under the wall plates of electrical outlets. Apply a good water-resistant varnish to paneling. Paint the walls with a low-permeance paint; it helps seal gases outside the room. In other words, try to prevent the formaldehyde from entering your living quarters. **PM**

Do you have a home-maintenance or repair problem? Send it to Homeowners' Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in the column. For more home-repair and maintenance help, get PM's Home Care Guide, $4.95 postpaid. Send your order(s) to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101.

SEARS NATIONAL

SAVE NOW ON MANY

SAVE 34%-50%

CRAFTSMAN®

(A) Pipe Clamps (#66742) **Save $10.99/Now $10.99*†**

(B) 4-piece Pliers Set (#45287) **Save $16.97/Now $21.99*†**

(C) 2-piece adjustable Wrench Set (#44619) **Save $8.99/Now $13.99*†**

These items on sale through Oct. 16 or while quantities last

(D) Hand Saw (#36193-4) **Save $7.50/Now $13.49***

(E) 16-oz. Curved Claw Hammer (#3820) **Save $6.00/Now $8.99***

(F) 10-in. Straight Jaw Locking Pliers (#45341) **Save $3.00/Now $4.99***

(G) 9½-in. Arc Joint® Pliers (#45381) **Save $4.00/Now $5.99***

(H) ¼-in. x 20-ft. Measuring Tape (#39217) **Save $4.50/Now $8.49***

YOUR CHOICE. NOW $329.88.

Craftsman® 10-in. Radial Arm Saw Outfit (#19927) with 1½-HP motor that develops 2½-HP. Cutting depth 3 in. at 90° and 2¼ in. at 45°. Crosscuts up to 15½ in. wide in 1-in. stock. **Save $250.*†**

On sale through Oct. 16 or while quantities last

Craftsman 10-in. Cast Iron Table Saw Outfit (#29803) with 1-HP motor that develops 2-HP. Cuts wood up to 3⅜ in. thick at 90° and 2¼ in. at 45.° Includes steel legs and two 10 x 27-in. extensions. Plus exclusive Exact-I-Cut indicator. **Save $160.***

CRAFTSMAN®

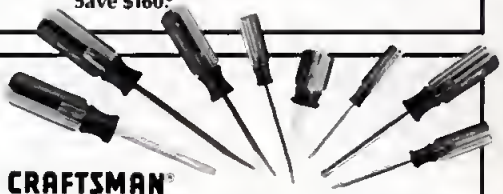
YOUR CHOICE $49.99

(A) 7¼-in. Circular Saw (#1095) with 2-HP motor. Cuts up to 2¼-in. at 90° and 2-in. at 45.° Includes Combination Blade **Save $25.***

(B) 3-in. Belt Sander with Case (#11705) with 14 sq. in. sanding surface and ¾-HP motor. Uses 3 x 21-in. sanding belts. **Save $36.*†** On sale through Oct. 16 or while quantities last

(C) 1-HP Router (#1746) with built-in work light. Convenient shaft lock and ring type depth gauge. **Save $35.***

(D) Sears Best ½-HP Sabre Saw (#1729) with trigger-controlled variable speeds and fast cutting 1-in. blade stroke. **Save $25.***



CRAFTSMAN®

Screwdrivers made of chrome-vandium steel and nickel-chrome plated for rust resistance. Impact-resistant plastic handles. Available while quantities last. SPECIAL PURCHASE (#41053).

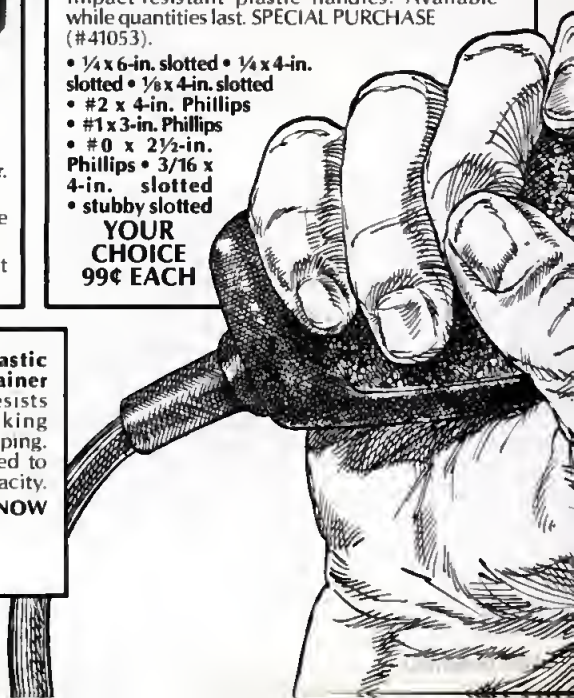
- **¼ x 6-in. slotted • ¼ x 4-in. slotted • ⅛ x 4-in. slotted**
- **#2 x 4-in. Phillips**
- **#1 x 3-in. Phillips**
- **#0 x 2½-in. Phillips • 3/16 x 4-in. slotted**
- **stubby slotted**

YOUR CHOICE 99¢ EACH

Craftsman 16-Gal. Wet/Dry Vac and Accessories. (#17823) Features Sears most powerful utility Vac. motor. Non-rusting tank. Hose, utility nozzle, 6-piece accessory kit, plus car nozzle. **Save $75.*†** **NOW $99.87.**

On sale through Oct. 23 or while quantities last

32-Gal. Plastic Trash Container (#6382). Resists freeze cracking and heat warping. Handles tested to 200 lbs. capacity. **Save 25%.* NOW $8.99.**



HARDWARE SALE
HARDWORKING VALUES.

STARTS Oct. 3

⅜-in. Drill (#1051) is reversible with variable no-load speeds of 0 to 1,200 rpm. Develops a maximum of ⅓-HP. Locking trigger switch.

NOW $29.99.

HALF* PRICE

SAVE 62%. NOW $29.99.

CRAFTSMAN®

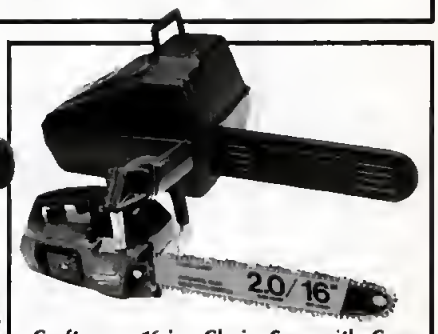
40-piece Tool Set (#33119) Sockets, ratchet and accessories made of tough alloy steel. Plus ¼ and ⅜-in. drive sizes to handle almost any job—tune-ups, assembly, home repairs. And more!

Savings based on regular separate prices from 1982-83 Catalog of Power and Hand Tools.

On sale through Oct. 16 or while quantities last.

Craftsman 18-in. Chain Saw with Case (#35727) 3.7 cu. in. engine. Iso-Vib handle system reduces vibration and fatigue. **Save $80.* NOW $269.99**

On sale through Oct. 23



Craftsman 16-in. Chain Saw with Case (#35734) 2.0 cu. in. engine. Features Power-Sharp® built-in chain sharpening system. Solid state ignition. **Save $65.*† NOW $169.99.** On sale through Oct. 23 or while quantities last

Craftsman Workbench (#10271) with rugged steel frame, 3 drawers, shelf and locking door. **Save $97.*†**

On sale through Oct. 16 or while quantities last

NOW $99.99.

ITEMS ON THESE TWO PAGES ON SALE OCT. 3-16 UNLESS OTHERWISE INDICATED.

* Minimum savings nationally.

† Savings based on regular separate retail prices.

Prices and dates apply only to continental United States.

Most items shown are at reduced prices

Available at most Sears retail stores.

SPECIAL PURCHASE

A special purchase, though not reduced, is an exceptional value

You can count on

Sears

© Sears, Roebuck and Co. 1982

SEARS NATIONAL

SAVE NOW ON MANY

(A) Sears Best Twill Work Shirt. Perma-Prest® polyester/cotton. **Save $3.* NOW $9.99**

(B) Denim Work Jeans. Perma-Prest® jeans of heavy duty polyester and cotton for comfort, long wear, and easy care. **Save $4.* NOW $10.99.**

(C) Perma-Prest® Chambray Shirt. Long sleeve. 50% polyester, 50% cotton. **Save $2.* NOW $6.99.**

(D) Denim Bib Overall. Perma-Prest® denim in a blend of polyester and cotton. Long wear that's comfortable too! **Save $5.* NOW $14.99.**

Roebuck Jeans. 14 oz. all cotton denim. Five pockets with rivets. All seams double stitched.
Save $5.*
NOW $11.99.

SAVE 30%*

Perma-Prest® Flannel Shirt. 75% cotton, 25% polyester.
Reg. Sizes **NOW $5.59.** Tall Sizes **NOW $6.99**

Sears Best Perma-Prest® Twill Work Pants. 65% Dacron® polyester, 35% cotton. Soil release finish.
NOW $10.49.

Wearmaster® Work Shoes and Boots. Full 9-month warranty on sole and heel.* Non-marking sole resists gas-oil-grease. Genuine leather upper for comfort. Lightweight construction.

On sale through Oct 23
* If the sole or heel wears out within 9 mos., return for free replacement

(A) Black Oxford—**NOW $29.99.**
(B) Black Shoe—**NOW $34.99.**
(C) Black Boot—**NOW $39.99.**

SAVE $10 each*

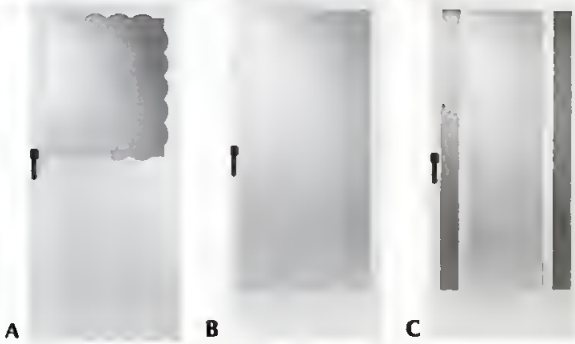
HARDWARE SALE

HARDWORKING VALUES.

STARTS Oct. 3

NOW $169.98

1/3 HP Garage Door Opener with TWO Solid State Transmitters. (#6649/6634) Over 3,000 code settings. Two button wall mount receiver. Plus a 4½-minute light. Easy to install. On sale through Oct. 23 or while quantities last. **Save $60.*** Savings based on regular separate retail prices.



Sears Premium Storm/Screen Doors.

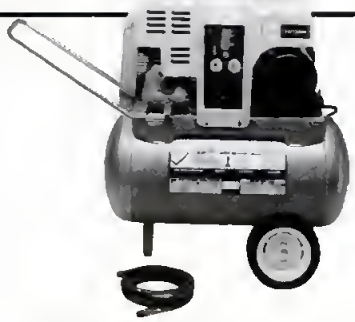
These doors offer attractive styling and features that provide durability, security and insulation. Foam-filled plastic core, massive keylock latch and deadbolt. Two sizes 32 x 80 in. and 36 x 80 in. Choose from three styles. Price can be applied toward computing energy tax credit.

SAVE $40 EACH*

(A) Crossbuck/Enamel finish (#2327)
(B) Full-view/Enamel Finish (#2328)
(C) Sidelite/Enamel Finish (#2331)
NOW $159.99 EACH

Easy Living® Satin Flat Interior Paint. (#91005) Durable; washable; one-coat coverage when applied as directed. **Save $6.**

NOW $9.99/Gal.



1 HP Craftsman® Compressor (#17621 or #17631) 12-gal. tank, air chuck and air hose for inflating, painting, cleaning and repairing. **Save $170.* NOW $349.99.**
On sale through Oct. 23

Craftsman® Electric Blower (#79893)
1 HP, air-cooled, permanent magnet motor which develops maximum 125 mph velocity at nozzle. High impact plastic housing.
Save $30.* NOW $49.99.

Sears Best Washerless Single Control Faucets (#20781), (#21943) 10-yr. limited warranty on parts.*
On sale through Oct. 23
* If faucet leaks or drips within 10 years, return for free replacement parts.
Save $20 each.* Both $29.99 each.

Power Miser™ Water Heater Insulation Jackets. Fits up to 52-gal. R-6 Insulation. Price can be applied toward computing energy tax credit. **Save $5.*** On sale through Oct. 23
FOR ELECTRIC WATER HEATERS (#1722) **$12.99**
FOR GAS WATER HEATERS (#1723) **$9.99**

Energy Saving Thrif-T Thermostat (#9100) with Triple Set back. Available while quantities last. Price can be applied toward computing energy tax credit.
SPECIAL PURCHASE NOW $39.99

Kenmore ½ HP Disposer (#6754) Stainless steel grind chamber. Quick mount collar. Available while quantities last.
SPECIAL PURCHASE NOW $69.88

ITEMS ON THESE TWO PAGES ON SALE OCT. 3-16 UNLESS OTHERWISE INDICATED.
*Minimum savings nationally.
Prices and dates apply only to continental United States.
Most items shown are at reduced prices.
Available at most Sears Retail Stores.
SPECIAL PURCHASE
A special purchase, though not reduced, is an exceptional value.

You can count on

Sears

© Sears, Roebuck and Co. 1982

CAR CLINIC

Consult a higher authority

One day the transmission in my 1980 Chevrolet pickup slipped out of gear as I was driving along. I coasted to a stop and found I had no second or third gear—just first. The trouble, according to a dealer, was a governor-driven gear that wore out. The dealer volunteered the information that six other vehicles in this area have had the same problem, and a friend of mine told me a 1981 Chevy pickup owned by his father-in-law failed the same way. This is really worrying me, because the replacement gear I had installed is made of the same material as the old gear. Am I heading for trouble again?—Stanley Wendorf, Beaver Dam, Wis.

I don't know. It depends on how long ago this happened, because replacement gears now available are not made of the same material as the original gear. They only look like they are.

The new gear is a glass-filled plastic that is very hard and able to override the scale which builds up between it and the drive gear. This scale is responsible for wiping out the weaker original gears. The part number for the new replacement gear is 6261660. This trouble may strike any automatic transmission—the MV4, or THM 400, 350 or 200—used with any engine on any GM car built before the new governor-driven gear was put into service.

If you feel you shouldn't have to pay for this repair, call the Chevy zone office for your area and explain the situation to a service representative. In your area, the zone office is in Milwaukee. The number is 414-784-2570.

I believe, therefore, that the permanent solution to your problem is to determine which ignition components (distributor cap or ignition cables) have failed and replace them.

Incidentally, the K-car has three additional splash shields protecting engine parts—one on the left side of the engine, one on the right side and one beneath to keep splash off drive belts. If part of a shield is broken off, or the whole shield is missing, road splash can be thrown on the distributor and ignition cables.

Making a splash for itself

My problem with the 2.2-liter engine of my 1981 Plymouth Reliant (K-car) is a wet distributor in stormy weather.

The car was recalled to replace the distributor protection shield with a larger one, but this hasn't helped. Consequently, I have to spray the distributor with silicone once a month to keep from stalling because of a drowned-out ignition. Is there no other solution?—Don Schmidt, Ligonier, Pa.

Before you other owners of K-cars become unduly concerned, let me say that the recall for the distributor shield Don is talking about occurred early in the car's history. K-cars leaving the Chrysler factory have had the larger splash shield installed since soon after K-car production began. However, not many earlier K-cars have a new vented distributor cap (part No. 5213034) that allows condensation trapped inside the cap to dissipate. Lack of this cap may be a contributing factor in your case, Don, but I don't believe it's the main reason why your distributor is drowning out.

I think that you may be overlooking a cracked distributor cap. The silicone spray you're using may be sealing the crack. You may also be spraying ignition cables which are damaged. In either case, this would account for the spray working a month; that is, while it seals the damage and prevents water from drowning out the ignition, until the silicone washes off completely.

Missing in Miss.

My vehicle, a 1979 Ford E-100 van with a 302-cu.-in. engine, has an odd problem. The trouble occurs only when I accelerate to pass another car and then am forced to slow down to 20 mph or less. At this point, the engine starts missing badly. If I turn off the engine and then restart it, the missing disappears. Other than this, the engine runs smooth as glass. It should, since I've done many tune-ups to try and resolve this problem. What do you think?—Earl C. Gist, Tishomingo, Miss.

I think the back pressure exhaust gas recirculation (EGR) valve is sticking in the open position, and the uneven combustion caused by exhaust

(Please turn to page 50)

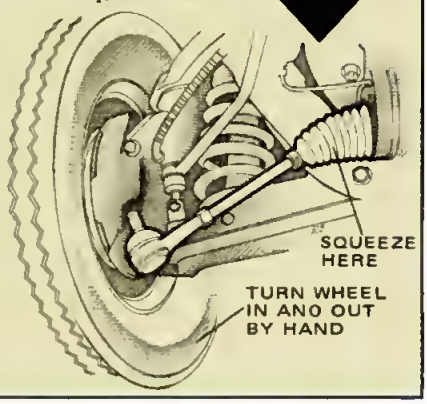
Sock it good

PM CAR CARE tip

Whenever you notice any vibration or wander in the steering of a front-wheel-drive car, you should inspect the inner tie rod sockets immediately. You can't do this visuelly, because eech socket (there ere two, one on each side) is covered by a boot. It has to be done by feel.

Raise the car, squeeze the boot over the socket, es shown in the illustration, and turn the wheel out and in. If you feel looseness in the socket, replece the tie rods on both sides of the steering linkage.

The time to perform this test is as soon as vibration or wandering is detected. Putting it off will only result in premature tire wear and will cost you more money in the long run.



IT DOESN'T TEAR UP THE NATION. IT TEARS UP A STATE.

AND WHO'S THERE TO HELP PUT IT ALL TOGETHER?

The Army National Guard of Kansas. Or Mississippi. Or whatever that emergency may be.

You see, the Guard is the military branch that's first to come to a state's rescue.

The Army Guard is trained as a partner of the Army in case of national defense. Then it puts that training to work to protect your state and community.

Won't you join us? Two days a month and two weeks annual training (after your initial training) lets you earn extra income and learn new skills while you protect everything that's close to you.

For more information, call your local Army Guard recruiter or call toll-free 800-638-7600.* And see if we can put it all together for you.

*In Hawaii: 737-5255; Puerto Rico: 723-4550; Virgin Islands (St. Croix): 773-6438; Maryland: 728-3388. In Alaska, consult your local phone directory.

The Guard is America at its best.

ARMY NATIONAL GUARD

(Continued from page 48)

gases flowing back into the engine is causing rough low-speed operation. When you shut off the engine, the pressure keeping the EGR valve open is removed, and the EGR valve closes and stays closed until the conditions that cause it to stick open are repeated.

To see if I'm right, drive the car until the symptom occurs. Then come to a halt and allow the engine to idle. If it is still running rough, pull the vacuum hose off the EGR valve and plug the hose. If this smooths out the idle, replace the EGR valve.

For whom the belts toll

I own a 1978 Honda Civic CVCC station wagon that has a dealer-installed air conditioner. The car, which has logged about 37,000 miles, has two problems. First, the water pump fails after 12,000 miles. I'm now on the third one. Second, I've been told that to replace the two drive belts, one of the motor mounts has to be loosened, and the entire job takes four hours. Please advise.—Jeffrey Craven, Waldorf, Md.

Honda has had an improved water pump available since mid-1980, so there's a good chance your most recent replacement will last longer. The part number is 094147, which fits 1976-79 Civic 1500s and wagons.

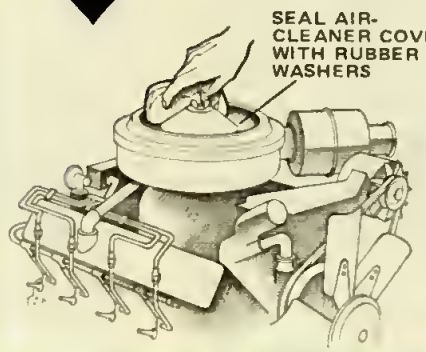
As for the belt job, I think whoever told you it takes four hours to remove two drive belts is a slow worker or doesn't know the correct replacement procedure. True, the motor mount has to be loosened, but according to the Honda warranty flat rate manual, the task from start to finish shouldn't take much longer than a half hour, assuming you have the Honda-approved air-conditioning unit installed in your car.

If I were you, I'd get another opinion or two.

PM CAR CARE **tip**

Wash tub

A Jan. '82 *Car Clinic* tip (*"Oh, That Beautiful Grime,"* page 28) cautioned against washing a diesel engine. However, it noted, if you insist on cleaning, wait for the engine to be ice cold before bathing to prevent infection pump damage.



Dennis Michrina of Sterling Heights, Mich., adds that water trapped in the depressions around GM diesel air-cleaner cover attaching nuts can leak into the intake manifold. This can cause hydrolock in the back cylinders. When pistons smack against water, a lot of damage occurs.

If you still must wash a diesel engine, seal the cracks by putting rubber washers between the flat washers and air-cleaner cover. Wipe depressions dry with a rag after washing.

"4 More MPG & 3 Seconds Quicker!"

—reports U.S. Automotive in Fresno, California, after installing Edelbrock's Performer 400 Package*

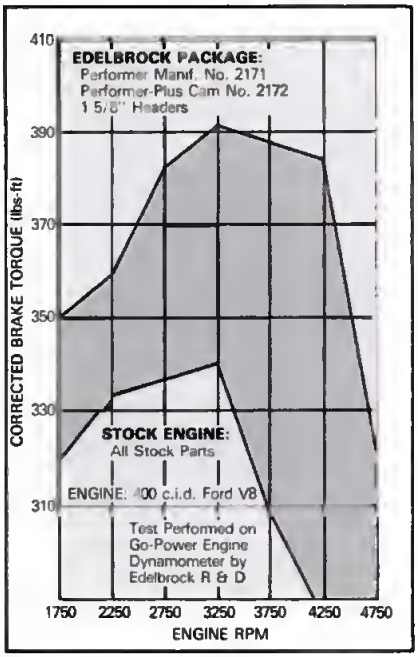
Edelbrock

PERFORMER™ Intake Manifolds!

With the new Performer manifold series, Edelbrock found a way to significantly improve engine power, performance and fuel economy potential. Performers are for people who *use* their vehicles—truck, van, RV, passenget car, 4X4—and *need* more from them. Available for most popular domestic V8's.** Get excited about driving again . . . with Edelbrock's new Performers!

PERFORMER-PLUS™ Camshafts, Dyno-Matched To Performer Manifolds!

The second step in Edelbrock's performance improvement package: an intake manifold and camshaft combination designed specifically to optimize engine output, while maintaining a smooth idle and mileage potential. The Perfotmet 400 Ford Package gtaphed here produced as much as 78 lbs-ft of totque more than the stock engine. Performer-Plus camshaft/lifter/lube kits** are available for each Performer manifold . . . they're made for each other!



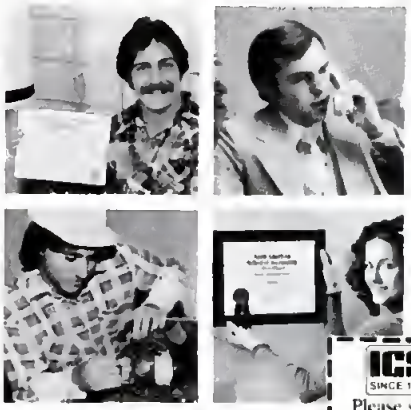
***THE PACKAGE:** U.S. Automotive's, Lyn McQuilliams, installed a Performer 400 manifold, Performet-Plus camshaft, 4-bbl carburetor and dual exhaust on a customer's 400 c.i.d. Ford Btonco. The 3-second acceleration gain was from a dead stop to 100 yards! Says Lyn, "My customer was elated!"

FREE Performer Package Test Result Summary & "Mini Catalog" *by writing to Edelbrock Corp., 411 Coral Circle, Dept. PM1082, El Segundo, CA 90245. All products are available by direct mail from Edelbrock Corp. Please send for a complete price list and order blank. California residents add 6% tax on all items.* ***Not legal for use in Calif. on pollution controlled vehicles.*

30 ways to help you qualify for the job you want!

FREE CAREER FACTS ABOUT DIPLOMAS AND COLLEGE DEGREES

Send for free facts and color brochure to find out what career training in the field of your choice might do for you—no obligation to buy anything now or ever. Now at home in your spare time, you can train for a money-making career...even get a college degree if you want...to help you get a better job. Find out everything you need to know about any one of these 30 career programs—with no obligation to buy anything, now or ever, and no salesman will call. Just check the one program that interests you most. You will receive free facts, color brochure and information on employment opportunities in the field you choose. Mail coupon today and see how easy it is to train at home for a great new career or advancement on your present job.



Open Book Exams...Adult Training
Your diploma or college degree is given to you for what you learn—not what you memorize. We send lessons and training material to your home. You decide when you are ready to take each "Open Book" exam. Then mail it to your instructor. Graded papers are returned to you with comments when needed to tell you how to correct your wrong answers. "Open Book" exams have proven so successful for adults, they are now used in many colleges. Our graduates tell us they like our method of independent study because it's so convenient and easy to do. You choose your own study hours in the privacy of your own home. You move ahead one step at a time, as fast or as slow as you want. And every Diploma or College Degree is fully accredited.

An Ideal Way to Learn
You waste no time traveling to and from class. And you never have to miss a paycheck. Skilled instructors are ready to help you at any time.

You get the same high-quality training that ICS has been known for since 1891.. the same kind of training program that's offered by giant companies to their employees, ..corporations like Union Carbide, International Paper, 3M, Bethlehem Steel, United States Steel, etc. And note that if you wish, ICS will keep your employer informed of your progress if you feel it can help you toward a better job, or an increase in salary.

No one can promise success but if you want more security, more day-to-day satisfaction and more of a future, send for free facts and the color brochure of your choice. There is no obligation and no salesman will call.

International Correspondence Schools
Diploma
awarded to

Could a Career Diploma Help You Earn $25,000 to 100,000 More in Your Lifetime?
Compare your present salary with the amount of money you could be making in any one of the careers listed below. Electricians average $11.25 an hour, auto mechanics over $8.00 an hour. And it's not only the money, but the fun of working in a job you like.

Could a College Degree Be Worth Thousands of Dollars to You?
A two-year degree that gives you an Associate in Specialized Business or in Specialized Technology could make a giant difference in your lifetime earnings compared to the average earnings of a high school graduate. Check the degree or career course you are most interested in and...

Mail coupon today for free facts and color brochure.

Mail coupon today for free facts and color brochure.

ICS SINCE 1891 **International Correspondence Schools,** Dept. PBS92
ICS Center, Scranton, Pennsylvania 18515

Please send me free facts, color brochure and full information on how I can study at home for the career I have chosen. I understand I am under no obligation and no salesman will call. **CHECK ONE BOX ONLY!**

COLLEGE DEGREE COURSES
- ☐ College Degree in Business Mgmt.
- ☐ College Degree in Accounting
- ☐ College Degree in Mechanical Engineering Technology
- ☐ College Degree in Electrical Engineering Technology
- ☐ College Degree in Civil Engineering Technology
- ☐ College Degree in Electronics Tech
- ☐ College Degree in Drafting Tech

- ☐ High School
- ☐ Income Tax Preparation*
- ☐ Veterinary Assistant*
- ☐ Hotel/Restaurant Mgmt
- ☐ Drafting*
- ☐ Small Business Mgmt
- ☐ Surveying & Mapping
- ☐ Electrician

CAREER COURSES
- ☐ Air Conditioning & Refrigeration
- ☐ Travel Agent*
- ☐ Diesel Mechanics
- ☐ Auto Mechanics
- ☐ Auto Body Repair
- ☐ Motorcycle Repair*
- ☐ Van/Car & Truck Customizing*
- ☐ Wildlife/Forestry Conservation*
- ☐ Firearms Repair*
- ☐ Art
- ☐ Machine Shop Tech
- ☐ General Law Enforcement*
- ☐ Bookkeeping*
- ☐ Interior Decorating
- ☐ Carpenter

*These courses are offered by North American Correspondence Schools. Both ICS and North American Correspondence Schools are divisions of National Education Corporation. They are Accredited Members of the National Home Study Council.

Name _____ Age _____
Address _____
City/State/Zip _____

24ZC

New scapegoat

My 1979 Plymouth Volare is hard to start. Winter or summer, I have to crank it at least five times before it catches. Although I let the engine warm up for five minutes before driving off, it stalls when I slow down to make a turn. It then hesitates until I reach the parkway. Thereafter, for the rest of the day, the car runs beautifully. I've had the car to a Chrysler dealer and several diagnostic centers, but to no avail. Everyone blames the electronic system, but no one can fix it. Can you help me?—Claire J. Hackert, Brooklyn, N.Y.

I'll lay even money that the trouble is a choke plate that's not closing as much as it should on cold-engine start-up. The reason may be a dirty or bent choke rod, damaged or dirty linkage, bad choke vacuum diaphragm, or dirty or damaged choke plate. But whatever the cause, it's easy to verify.

Start the engine (cold). Remove the air cleaner, so you can look at the choke plate. If the choke plate isn't closed over the carburetor bore, a choke system part is damaged. Incidentally, if the trouble is being caused by a choke linkage that's binding because of too much play—that is, the choke linkage is getting hung up—you can cure it by installing a choke rod retainer clip (part No. 4095966).

The choke adjustment on this car is fixed, but the fast-idle cam, which controls cold-engine idle speed, can be adjusted. The fast-idle cam is attached to the carburetor throttle shaft where it has a series of graduated steps.

To check the idle adjustment, turn the cam until the adjustment screw is resting against the second step. Move the choke flap towards the closed position and measure clearance between it and the carb body. It should be .070 in. If it isn't, bend the rod that connects the cam to the choke flap until you obtain the correct clearance.

Too many technicians are too quick to blame problems on electronics. It makes you wonder what's happened to good, old-fashioned troubleshooting?

DO YOU HAVE A CAR PROBLEM?

Just ask Mort about it. Send your question to the Car Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. While letters cannot be answered individually, problems that are of general interest will be discussed in the column.

SERVICE TIPS

■ If you haven't had luck getting a GM 4.3-liter V6 diesel engine with Cruise Control to idle properly, listen up. To set low idle speed, disconnect the cable at the Cruise Control servo essembly to keep the cable from holding the throttle off the idle stop and converting a low idle speed into a high idle speed.

■ A driveability problem with an '82 Oldsmobile Delta 88 equipped with 3.8-liter V6 engine can probably be squared ewey by getting your dealer to consult TSB 82-T-8. If checks listed in the bulletin fail to clear up e "chuggle" at 40 to 45 mph, the dealer is authorized to install a new PROM (part No. 17079014). Both parts may be used together.

■ A 1982 Chrysler K-car 2.2-liter engine with eutomatic transmission thet runs rough in cold weather immediately upon starting mey be fixed by installing a new choke vacuum delay valve (part No. 4173433). Suggest that your dealer see bulletin TSB 14-26-82. PM

STEVE TOTH

APPLIANCE CLINIC

Cooling off an over-heated stove

I have a Sears Kenmore electric stove model No. 155-455-7200, serial No. 82965. The temperature in the oven cannot be controlled with the thermostat. No matter where I set the knob, it goes directly to high heat. The door gasket is partly gone, too. I have electrical experience. Could I tackle the job myself?—E. Carlson, West Creek, N.J.

Why not! Call Sears and give them your model and serial numbers. Order the thermostat, part No. K14025, and door gasket, part No. K15207.

To install the parts, shut off power to the range. Ask a friend to help you remove the range from the cabinet. Put a rug or other padding on the floor to prevent scratches.

The thermostat is mounted on the control panel above the oven door. Attached to the thermostat is a 36-in. capillary tube which goes to the rear outside of the oven cavity. You will have to remove the rear access panel in order to get at this end of the thermostat.

When installing the new thermostat, don't damage or kink the capillary tube. Also, when disconnecting the wires on the thermostat, label them with masking tape to help you reconnect them properly.

To replace the door gasket, remove the door. Lay it down on the kitchen table (again covering the surface to prevent scratches). Loosen the four screws on the inner door panel. Slide the old gasket from under the panel. Install the new gasket and retighten the screws.

For further help on installing the thermostat, see the illustrated sequence on pages 90 and 91 of the *Popular Mechanics Home Appliance Repair Manual*. Get it at your local bookstore or send a check for $25.90 (includes postage) to: Hearst Books, 224 West 57th St., New York, N.Y. 10019.

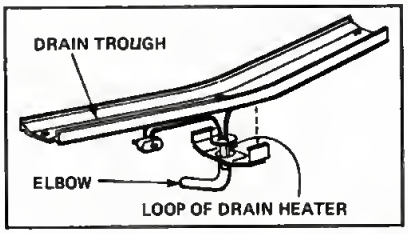
Curved drain tube

I own a 1966 Admiral duplex refrigerator Model ND-2265, serial No. 5322383. In the refrigerator compartment, I was able to clear the drain by running a flexible wire inside the tube. The freezer side, however, can't be cleared. When it defrosts, the water runs inside the box and freezes into a cake of ice. How can I free this drain so the water will run out?—Albertino Azevedo, Mendon, Mass.

Sounds like your problem is with the drain-trough heater. The heater is designed to warm the drain trough to prevent the defrost water from refreezing before it drains out of the cabinet. To check the heater, first remove the air baffle in the bottom of the freezer section in front of the drain. The heater is plugged into a harness receptacle below the drain trough. Unplug the heater at this point.

Make an ohmmeter continuity test, between the plug prongs. If you don't get a reading, the heater is defective. The replacement heater is part No. 27525-11; it's approximately $23, plus tax, at an Admiral parts house or distributor.

To replace the drain-trough heater, remove the trough mounting screws and unplug the heater. Next, remove the spring clip which holds the drain tube to the bottom of the trough. Pry it loose at the front lip of the trough. Lift the trough straight up so the loop of the heater pulls out of the drain tube easily. Pull the defective heater out of the grooves on the bottom of the trough. Once you've removed the heater from the drain, use a solution of warm water and vinegar to clean out the drain tube. Push the new heater wire back into the grooves. Make sure to leave a loop at the drain opening so it can be pushed into the drain tube.



The drain-trough heater, directly below the drain trough, ensures that water from defrosting doesn't refreeze in drain.

Runs dry on high

I have a Sears clothes washer model No. 110-72450110. The tub continues to fill, even after the high-water level has been reached. The agitator starts, then the water is pumped out of the machine. The medium and low levels work fine. I replaced the water-level switch and the machine worked fine for three weeks. Now I have the same problem again. Do you have any suggestions?—Andrew Kuruc, Clifton, N.J.

Sounds as if your problem lies in the timer assembly. The cams in the timer are probably worn or slipping, telling the machine the wrong thing to do during the cycle. The replacement timer is part No. 372561. It costs about $36.25 at any Sears repair parts center.

Rattling refrigerator

The compressor of our 10-year-old Gibson Sovereign Frost Clear refrigerator Model 825716R1C, serial No. 0915422157, rattles when it's operating. It becomes louder when the compressor is shutting off. The Gibson serviceman told us that this condition couldn't be repaired. The refrigerator operates normally otherwise. Can anything be done?—Carmen Julian, Latham, N.Y.

Because of the age of the refrigerator, it is no longer covered under the manufacturer's 10-year guarantee. Apparently, the internal compressor mounting springs inside the compressor have become worn or broken. This makes the internal mechanism bang against the outside of the shell of the compressor, causing the rattle. The only way to remedy this is to have the compressor replaced. PM

If you have a problem with any appliance, send your question, along with the model and serial numbers, to Appliance Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Sorry, but letters cannot be answered individually. Problems of wide interest will be discussed in this column.

Did you say 1/3 less tar?
Pall Mall Light 100's.
A third less tar than the leading filter king, and still great taste.
20 FILTER CIGARETTES
PALL MALL
LIGHT 100's
LOW TAR · FILTER
Pall Mall Light 100's 9 mg. tar 0.8 mg. nic.
Leading filter king 15 mg. tar 1.1 mg. nic.
Lowest brand less than 0.01 mg. tar. 0.002 mg. nic.
9 mg. "tar", 0.8 mg. nicotine av. per cigarette, FTC Report Dec. '81.
Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health

Flapper Earns Big $

IMAGINE: FIVE OR SIX TEENAGERS *EACH* EARNING YOU FROM $100.00 TO $700.00 PER WEEKEND . . . .

One of the last, all time *great* -- and overlooked -- wealth producing methods is *demonstration* merchandising, using part-time teens on commission. In malls, department stores, "shows", and outdoors in good weather.

It's unconventional. It's fun. Simple to maintain and *enormously* profitable. We're innovators in this field; building a chain of reserved-area distributors in the U.S., Canada and overseas.

FIELD TESTS

Our philosophy is simple. We review thousands of new inventions for maximum impulse-buying qualities then run field tests; finally taking on only the most crowd-stopping, high income "*winners*."

Our few "winners" have so much pulse-thumping "pizazz" and flair that people stop, watch, then *ask* to buy. And our distributors' hired youngsters don't even have to *talk!* A cassette recording does the presentation. Moreover, our step-by-step, *in-depth* manuals cover everything from obtaining top locations to *exact* set-up and demonstration methods.

OUR NEWEST PRODUCT

Our distributors laughed when we invited them, (practically shouted from the rooftops!), to get them into the mechanical bird business . . .

Our newest, ultra "hot" product, you wind it up and — flapping its' wings like crazy — it looks like a *real* bird, and flies hundreds of feet with no lead wires or strings! It's *sensational*. French precision made from Leonardo Da Vinci's actual plans, it's an engineering marvel in super-tough plastic, with 16" wingspan. And it's becoming a national novelty *phenomenon*, as were Hula Hoops and Pet Rocks.

Our flapper-birds can be set for high-flying stunts, loop-the-loops, straight-line, circular flights — like a boomerang — or *tight* circles for indoors demonstration. Thus, here's the next "FRISBEE"!

Now, since tying up an entire factory's production, our distributors *still* laugh; at the "recession" and because this product is fun. It draws tremendous crowds; mostly "adult" males and teens, *itching* to fly one themselves. After the cassette presentation and demonstration, they line up to *buy*.

But our distributors' bankers aren't laughing. They're *impressed*. At only $6.95 retail and as low as $2.60 cost, our people net an honest, actual $100.00 to $700.00 per location, and many oversee three to six spots per weekend! What's more, mailed-in reorders are *constant*.

TYPICAL COMMENTS:

• "I'm not a salesman and I was skeptical that this would work for me. Guess I was wrong. The very first weekend we retailed 323 birds! ($1,220.00 approx. net). We didn't do any 'selling'; our commissioned youngsters just kept birds in the air. When people asked if they could buy one, I pointed to my wife who took the money. The people were amazed and BOUGHT. That's all. The bird sells exactly as you said it would. So many businesses are advertised to be more than what they are, it sure was refreshing to find one that does MORE than advertised." BOB LANGHOR, BRIGHTON, MICH.

• "Money is very tight around here, like everywhere else; but my first Saturday, I didn't even have time to eat! My hired kids sold 271 birds at $7.95, plus 185 more on Sunday. Netted $1,700.00! I'm wholesaling too — A businessman approached me and ordered 1,800. And within five weekends, my brother's demonstrators in N. Carolina marketed 1,772 birds! This really works!" GREGORY E. THOMPSON, MARSHALL, MO.

• "I was a 'doubling Thomas' but now have kids demonstrating in malls, on streetcorners and like markets; drawing large crowds and excellent profits. I often earn at least $1,500.00 per weekend. One full week I netted $6,500.00!" DALE CAMPBELL, FRIDLEY, MINN.

UNIQUE DISTRIBUTORSHIPS

Many offers in this magazine are good. Some very good. But our distributors *enjoy* their "work", earning more in a weekend than others earn in a month, pay no franchise fees, nil risk factor, almost nil inventory, *no fixed investment* or *overhead* as mall, dept. store and "show" space rent is on % of *sales;* and many spots are *free* . . . . Just send five or six kids to busy parks or city sidewalks. We assign an approx. 300,000 population area to each authorized distributor. First come, first assigned. Only 350 more in the U.S. and Canada and "the door's *closed*".

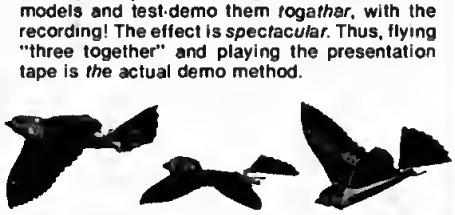
TEST DEMONSTRATION

Interested? Request samples *and* our crowd-stopping cassette presentation. We'll telex *wire* our Boston, Mass. shipping terminal the day your request arrives, for *rush* UPS delivery. Test-demo the samples and play the tape anywhere people are passing. Then you'll *know* what you've got. You'll be *ecstatic*, and could order as few as 72 birds to start.

If you wish, "check us out" first. Located in "Friendly Alberta" — just north of Spokane, Wash — we're rated by D & B and most all commercial rating agencies; U.S., Canadian and International. We shipped over three million $ in product, to happy U.S. distributors in 1981 & '82. But if your area's already *taken*, we'll return your letter and contents.

TYPE OR PRINT, *NEATLY!!* Send check, money order, or Visa-Mastercard # with cardholder's name and expiry date. *Special Delivery* = 4 days to us, regular 1st Class (20¢) = 7 to 9 days.

If you're *seriously* interested, we urge you — we implore you — to request all three color models and test-demo them *together*, with the recording! The effect is *spectacular*. Thus, flying "three together" and playing the presentation tape is *the* actual demo method.



Costs include UPS and MANUAL of $5.00 value:
3 BIRDS *(ALL 3 COLORS)* + MANUAL: $19.95
1 BIRD (only one color) + MANUAL: $ 9.95
DEMO TAPE: With all 3 birds, add only $4.95.
(With 1 bird, add regular $9.95)

Also demo our new "STUNT PLANE"!
It flies like a *boomerang*. For sample, add $2.00

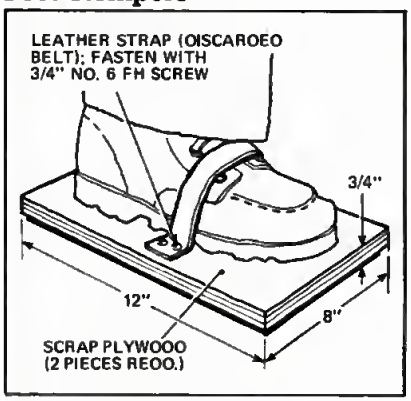
J & R

J & R SUNSHINE and CHEER CO., LTD.

ORDERING OFFICE:
Dept. PM-1, 4607 Gaetz Ave.,
Red Deer, Alberta, Canada, T4N 3Z9
(U.S. SHIPPING TERMINAL: in Boston, Mass.)

HINTS FROM READERS

Foot stompers



In areas of moderate climate, you can seed cool-season grasses into dormant Bermuda grass in early October and November, to get a healthy-looking lawn that lasts throughout the winter. Mow the existing grass to about 1 in. and slice the soil ¼ to ½ in. deep with a hand rake. Spread a layer of starter fertilizer over the lawn; then plant the seed and work it lightly into the soil, using a pair of foot stompers. The stompers take the place of a lawn roller to assure a firm seed bed.

I made mine of scrap plywood with straps, as shown above. All I do is put them on and walk over the topsoil until I'm satisfied that it has been tamped uniformly flat. Result: a lawn which is as thick as if it had been done professionally. You can also use the stompers for spring seeding and filling in bare spots at other times.

—*William Slamer*

Stainproofing tile grout

You can seal cement-based grout with lemon-oil furniture polish to prevent food spills and grease spots from staining tile counters and floors. This treatment also makes cleanup easier. Over a period of time, additional applications are recommended for heavy-use areas or tiles that are near heat.

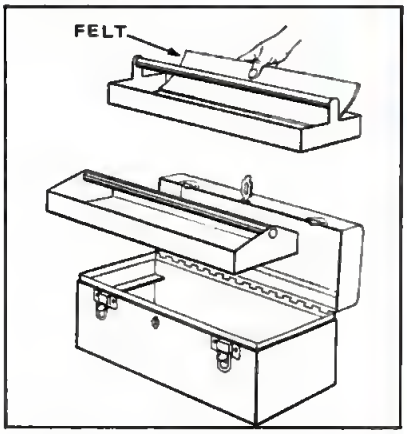
Caution: This method might cause some darkening of the grout, and it could produce a shine on unglazed tile; so test the treatment in an inconspicuous spot first. American Olean, the tile manufacturer, suggests using liquid oil polish, rather than a spray, in these instances. PM

HINTS FROM READERS

Making tool pegs visible

To make your tools easier to locate where illumination is poor, add color accent to nails, pegs and other supports used to hang tools and keys. The simplest way to do this is to cut discs of brightly colored cardboard, punch holes in their centers and hang them on the supports. You can achieve the same effect by painting colorful circles around the tool supports.—*Walter E. Burton*

Protecting tools



This method of protecting tools which are carried in a portable toolbox was suggested to us by PM reader Frank H. Burgmeier of the Hand Tools Institute: Line the bottom and the lift-out tray of your toolbox with felt. This simple procedure helps preserve the edges of cutting tools. It prolongs tool life and also lengthens the time between sharpening jobs. PM

Try gold rum—the smooth alternative to bourbons, blends, Canadians, even Scotch. The first sip will amaze you. The second will convert you.

Make sure the rum is from Puerto Rico.

Rum has been made in Puerto Rico for almost five centuries. Our specialized skills and dedication have produced rums of exceptional dryness and purity. No wonder 86% of the rum sold in this country comes from Puerto Rico.

RUMS OF PUERTO RICO

Aged for smoothness and taste.

For free Rums of Puerto Rico recipes write Puerto Rican Rums Dept PM-4, 1290 Avenue of the Americas, N.Y. N.Y. 10102 © 1982 Government of Puerto Rico

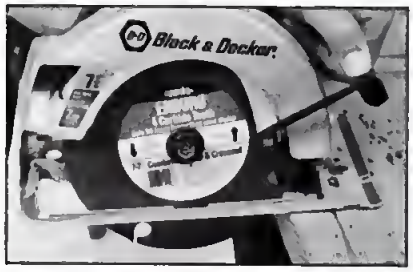
THE PM WORKBENCH

Carbide blades at steel-blade prices

This unique saw blade from Credo, Omark Industries, 2765 National Way, Woodburn, Ore. 97071, is unlike any other saw blade I've ever used.

I recently put one through its paces on my table saw and in the portable saw shown. The blade's design—each tooth is preceded by a gradual ramp controlling the amount of wood exposed for the cut—minimizes rough cuts and, more importantly, kickback.

Available in most popular saw sizes, the Enduro carbide blade sells at steel-blade prices: 6½ in., $7.10; 7-7¼ in., $7.10; 8 in., $9.52; 9 in., $11.92; and 10 in., $13.14. Since teeth are claimed to last 50 times longer than the teeth on a steel blade, the carbide blade is a great value.—*H.W.*



Maker claims saw can start with blade butted against work. We tried it. It can, but don't try it with conventional blade.

Unusual carbide-tipped blade comes in most commonly used saw diameters. Cut is relatively smooth, but blade doesn't give smoothness needed for fine cabinetmaking.

Help for finishers

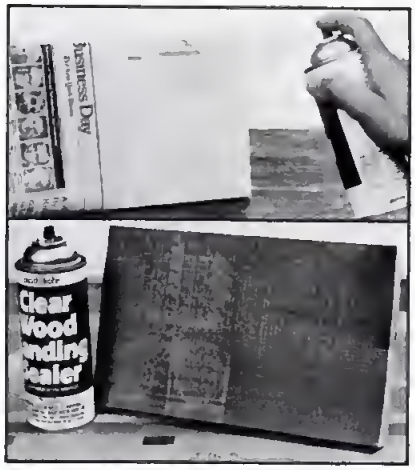
If you're a woodworker—as many PM readers are—the time comes when you have to master the art of putting a finish on your furniture projects.

It is not at all uncommon for a very fine woodworker to produce a less-than-desirable finish, usually because of grain raising. Help for this problem comes in a can labeled Sanding Sealer. Manufactured by PlastiKote Co. Inc., Box 708, Medina, Ohio 44258, the product is available nationally, at paint stores and home centers. It's packaged in four container sizes: 1 pint, $4.40; 1 quart, $6.60; and 1 gallon, $19.60. It also comes in a 16-ounce aerosol for $3.50.

The sealer is ideal for application between finish coats to minimize grain raising, thus sanding. I tried it as a prestain sealer and it works like a charm.

Sanding Sealer finishing product is available for brush-on and spray applications.

One word of caution: The maker advises that Sanding Sealer *cannot* be used with a polyurethane overcoat—either clear or color. It is safe for use with conventional varnish.—*H.W.*



Author used aerosol version (top) to test product on sample piece of pine with e relatively wild grain—too wild if it were used in a furniture project. Mask was removed and board stained (above).

Update

I recently received a letter from PM reader John Whitacre of Chambersburg, Pa.; it's one of several letters that have come in on the same subject.

John asked about the belt system described in the story on John Opfer's Great Shop (*This Master Craftsman's Dream Shop Is In A Log Cabin*, page 108, Nov. '80). No, John, you didn't miss it, because it hasn't yet appeared in the magazine. At PM, we do the things we write about. Thus, we will install and work with the setup in our own workshop before releasing any details to our readers.
—*H.W.*

If you've come across a new product with some special features, let us know about it. Write to PM Workbench, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019

Start your own money making business!

Make up to $12.50 an hour— even while learning!

Train FAST at home!

Be Your Own Boss!

Get into this booming high-profit business that's Easy to learn—Easy to do—Easy on You!

Never before have money-making opportunities been so great for qualified Locksmiths. Now lucrative regular lock and key business has multiplied a thousandfold as millions seek more protection against zooming crime. Yet there's only one Locksmith for every 17,000 people!

Start Collecting CASH PROFITS Right Away

You're "in business" ready to earn $5 to $12.50 an hour a few days after you begin Foley - Belsaw's shortcut training. Take advantage of today's unprecedented opportunities in locksmithing for year - round EXTRA INCOME in spare time — or fulltime in a high-profit business of your own. Hundreds we've trained have done it. So can YOU! All tools plus professional Key Machine given you with course. These plus practice materials and equipment, plus simple, illustrated lessons, plus expert supervision, plus business-building guidance will enable you to KEEP THE MONEY COMING IN! Ideal for retirement — good jobs, too.

SEND FOR EXCITING FACTS—No Obligation

Discover what's in Locksmithing for you — how Foley-Belsaw's Master Locksmith-approved training can give you the skill you can depend on to EARN MORE — ENJOY LIFE MORE.

No Extra Cost! Included With Your Locksmith Training

BURGLAR ALARM and SECURITY SYSTEMS

training. Covers all phases of Burglar, Hold-Up and Fire Alarm servicing and installation. This valuable and timely instruction includes all special tools and supplies. ONLY Foley-Belsaw offers such extensive training in this rapidly expanding field as a part of your Locksmith training.

ADVANCED Locksmithing!

How to change combinations, install and service Safe, Vault and Bank Safe-Deposit Box locks. You learn-by-doing on the locks that we supply. You'll find it fascinating and highly profitable work.

BE A LOCKSMITH!

Hundreds of Foley-Belsaw trained men have succeeded in this fascinating and highly profitable field . . .

"Before enrolling I checked other courses and also asked for advice from several locksmiths in my area. They all said yours was tops and has the most versatile Key Machine.

"I always wanted to be in business for myself and now I am . . . thanks to Foley-Belsaw Institute.

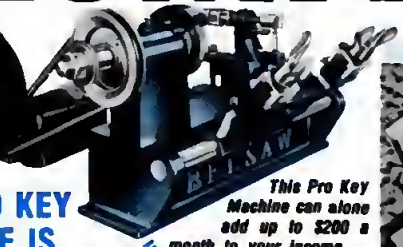
David Fairbrother—Dave's Locksmith Service Milwaukee, Wisconsin 53209

"I opened my own business, spare time, seven months after I enrolled and made a profit of $329 for the first week."
B. A. Deberry Littleton, Colorado

"No more hard, nasty work for me. Now I have my own business and with hardly any effort I average around $50 a day. Thanks for my new start in life."
Sam Walker Prichard, Alabama

...YOU Can Do It Too!

10-DAY NO RISK TRIAL! Send for details!



THIS PRO KEY MACHINE IS YOURS TO KEEP! FREE

This Pro Key Machine can alone add up to $200 a month to your income . . . and it won't cost you a penny extra with your training.

ALL SPECIAL TOOLS AND EQUIPMENT INCLUDED!

Find out all about it! Send for FREE Facts TODAY!

Just fill in and mail coupon below (or send postcard) to receive full information and details by return mail. *DO IT TODAY!*

RUSH COUPON!

FOLEY-BELSAW INSTITUTE
10001 Field Bldg., Kansas City, Mo. 64111

There is NO OBLIGATION and NO SALESMAN Will Call—ever!

RUSH COUPON TODAY FOR THIS FACT-FILLED

FREE BOOKLET!

Tells how you quickly train to be your own boss in a profitable Sparetime or Fulltime business of your own PLUS complete details on our 10-Day NO RISK Trial Offer!

Send for your copy today!

FOLEY-BELSAW INSTITUTE
10001 FIELD BUILDING
KANSAS CITY, MISSOURI 64111

FOLEY BELSAW

☐ YES, please send me the FREE booklet that gives full details about starting my own business in Locksmithing. I understand there is no obligation and that no salesman will call.

Name _____

Address _____

City _____

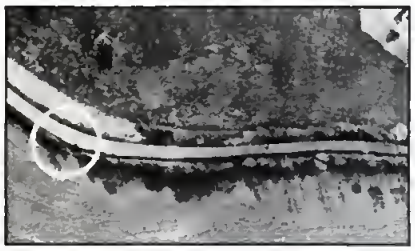
State _____ Zip _____

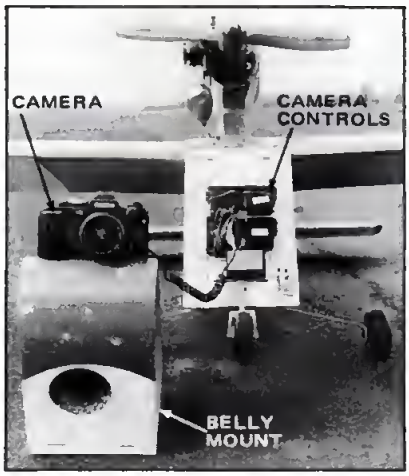
SCIENCE WORLDWIDE

Britain's model air surveyor

What do you do when you must take regular aerial surveys, but the budget has been scaled way down and you can't afford a plane? The answer for the Thames Water Authority, which maintains 20 miles of water pipelines in suburban London, was to scale down the plane.

Oscar Addyman, water company manager and model-airplane flier, withdrew just a little more than





Model plane (above) took photo (left) at 400 ft. Circled vehicle indicates scale.

$1,000 from the corporate coffers to come up with a remote-control craft that can take standard or infrared photos from the air. A wood box in the craft's belly contains a 35-mm camera with motor drive that's radio-linked to the ground. The entire package weighs 19 pounds.

Addyman's surveyor craft uses a .25-cu.-in. engine to carry it 400 feet aloft. A mission, which takes about five minutes, uses less than $5 worth of special model craft fuel and produces one roll of aerial photographs. (The number of photos depends on the timing of each exposure.) The daylight photo is of a stretch of conduit near London.

Heart scare

Giving a patient a sedative by injection before heart surgery may create so much anxiety that the patient's heartbeat becomes dangerously irregular, according to preliminary findings of University of Michigan researchers. They recommend that heart surgeons consider giving sedatives orally, especially before bypass surgery. The Michigan medics emphasize that more research is needed to document the stress relationship.

Evolution today

University of Maine zoologist Irving Kornfield, working with an EARTHWATCH research team, has discovered a rare case of evolution in progress. In running genetic tests on what had appeared to be two different kinds of fish—one a plant-eater with fine teeth, and the other a snail-eater with crushing teeth—Kornfield has discovered the fish have identical genes. EARTHWATCH says the fish, Mexican *Chiclasoma minckleyi*, may have a recessive gene that determines the shape of the teeth.

It isn't unusual to find one-celled organisms in the midst of evolution. But Kornfield's discovery is a one-in-a-million case. It may help change the current trend of classifying animals by outward physical characteristics. Classification may soon be done by genetic makeup.

EARTHWATCH is a nonprofit, scientific research organization.

Sasquatch watch

If you think you've seen evidence of a Big Foot, Sasquatch or other legendary monster, there's a new scientific organization that wants to hear from you. The International Society of Cryptozoology was organized by scientists who have investigated such reports independently.

"We wanted to create a central information source," explains J. Richard Greenwell, a University of Arizona researcher and secretary of the group. Members have no preconceived notions about the truth of reports of monsters. As Greenwell points out, "There's got to be some kind of explanation, be it physical or psychological." Greenwell notes that many animals once considered mythical have turned out to be real. Gorillas, for instance, were considered legendary outside Africa until one was captured in 1855.

To report a sighting, or to inquire about previous sightings, write to the International Society of Cryptozoology, Box 43070, Tucson, Ariz. 85700.

I whistle for animals

Will such a slogan appear on bumper stickers in the future? Researchers of the World Federation for Animal Protection in Austria believe that ultrasonic whistles—making piercing sounds heard by animals, but not by humans—can be used to chase deer and other animals away from highways. American researchers, however, are less enthusiastic about the effectiveness of such devices.

The federation tested a device called Sav-A-Life. The inch-long whistle, shaped like a megaphone, mounts on a car's bumper. As the auto moves, air rushes through the whistle, creating the ultrasonic noise. Clayton Anderson, whose Marcla Corp. distributes the whistle in the United States, says ultrasonics may reduce the number of highway accidents involving deer each year by hundreds.

So, we asked Steve Shumake, a U.S. Fish and Wildlife Service psychologist, how his experiments with a number of devices were going. He told us the ultrasonics have worked "in some instances in our tests with rodents. But sometimes they didn't work. And I'm not sure I'd rely on them to protect animals." PM

OVER THE NEXT 20 YEARS, THE COST OF BEING AN EXECUTIVE IS GOING TO SOAR.

But Allstate can help keep your life insurance premiums down. As your coverage helps you keep up with inflation.

Why worry about being underinsured? You can arrange to have your life insurance coverage increased 5% or 10% a year, automatically, over the next 10-30 years. That's one advantage of Allstate's Execu-Term plan. Another is that your premiums will always be based on your age at the beginning of each ten-year term. If you're looking for permanent protection, ask about our Execu-Plus plan.

Another good inflation hedge is our new Life Accumulator policy where your cash values can grow at competitive interest rates.

You can also help secure your family's home with an Allstate Mortgage Protection plan. Or help secure your retirement with an Allstate IRA plan.

Right now, we're offering a lot of life insurance at our lowest prices ever. So, it's a good time to see your Allstate agent for the life, home and auto coverage best suited to your needs. That way, you'll stay ahead of the game.

Allstate®
You're in good hands.

Allstate Life Insurance Company
Allstate Insurance Company
Northbrook, Illinois

Execu-Term is our Increasing Renewable and Convertible Term policy. **Execu-Plus** is our Increasing Whole Life policy. **Life Accumulator** is our Increasing Life Insurance to Age 65 with Maturity Value at Age 65 policy. **Mortgage Protection** is our Decreasing Term policy. **Individual Retirement Annuity (IRA)** is our Flexible Premium Retirement Annuity. Products available in most states.

THE FIRST

TOUGH V8 DIESEL POWER

America's best-selling truck diesel is now available in tough Chevy Vans and Sportvans. Now you can get available 6.2 Liter (379 Cu. In.) V8 Diesel power in 1983 G20/30 Series Chevy Vans and Sportvans. It's already in service in over 100,000 full-size 1982 Chevy Pickups, 4WD Blazers, Suburbans and Step-Vans. That kind of acceptance says a lot about the performance and desirability of this diesel power. The 6.2 Liter Diesel in a G20 Chevy Van offers you up to 24% better fuel efficiency than a 5.0 Liter (305 Cu. In.) 4-Bbl. V8 gas engine in the same vehicle. And the 6.2 Liter Diesel provides up to 33% better fuel efficiency than this gas engine in a G20 Sportvan. Consider these impressive mileage figures.

30 EST HWY **20** EPA EST MPG *G20 SPORTVAN WITH OPTIONAL 6 2L DIESEL AND AUTOMATIC OVERDRIVE

31 EST HWY **21** EPA EST MPG *G20 CHEVY VAN WITH OPTIONAL 6 2L DIESEL AND AUTOMATIC OVERDRIVE

Chevy's G30 Diesel Van. The Chevy Van advantage goes way beyond diesel power. The available 6.2 Liter Diesel G30 Chevy Van is rated at 240 lbs.-ft. of torque at 2000 RPM. So Chevy Van digs in and hauls hard under full loads (up to 3682 lbs., including passengers, equipment and

125" WB Diesel Chevy Van.

TOUGH CHEVY TRUCKS ARE

TIME EVER

IN STANDARD-SIZE VANS.

cargo, in a properly equipped model). All long-wheelbase models have a big 296 cu. ft. of load space—and load length for a 14-foot ladder! What's more, a properly equipped G30 Chevy Van can move up to 12,000 pounds, including itself, passengers, equipment, cargo and trailer.

Chevy's Diesel Sportvan. Here's how Chevy moves people with style, comfort and convenience. There's standard seating for five, but the G20 Sportvan offers optional seating for eight and the G30 model offers optional seating for eight or twelve. In addition, quick-release rear bench seats help convert Sportvan from people-carrying to cargo-carrying in a hurry.

3-Year/50,000-Mile Power-Protection-Plus Limited Warranty on Diesel Engines. Subject to deductible after first 12 months/12,000 miles. See your Chevy dealer for full details.

*Use estimated MPG for comparisons. Your mileage may differ depending on speed, distance, weather. Actual highway mileage lower. In Calif., Chevy Van 30 Est. Hwy., 20 EPA Est. MPG. Some Chevrolet trucks are equipped with engines produced by other GM divisions, subsidiaries, or affiliated companies worldwide. See your dealer for details.

125" WB Diesel Sportvan.

Optional Beauville Interior.

Sportvan with optional Travel Bed Package.

TAKING CHARGE

CHEVROLET

THE PM GARAGE

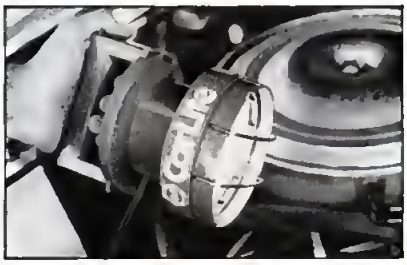
Safety light is versatile, too

A flashlight that you keep in your glovebox may give you peace of mind, but on too many occasions aging batteries can't provide you with good illumination when you really need it.

Black and Decker's CarLight has no batteries to run down. The light plugs into any 12-volt cigaret lighter and combines a spotlight, warning flasher and worklight all in one unit. CarLight has a flashing or constant beam controlled by a three-way switch. A red lens snaps into place for warning light use.

We found CarLite handy to use and its illumination excellent; the only disadvantage is that it won't fit into most gloveboxes. It's available for approximately $13 at hardware outlets.

—*John Lamm*



Plug-in CarLight serves as a combination spotlight, warning flasher and worklight in one versatile unit.

Interior cleaner

Fancy plush interiors may look attractive, but if little travelers should get carsick on long trips or use fingerpaints to pass the time, it can be a real headache to keep those interiors clean.

We found one product, Happy Car Care, that was able to neutralize anything any kid was able to dish out—including crayon that was ground into the velour upholstery. The cleaner also overpowered grease spots deposited by a mechanic's soiled work clothes.

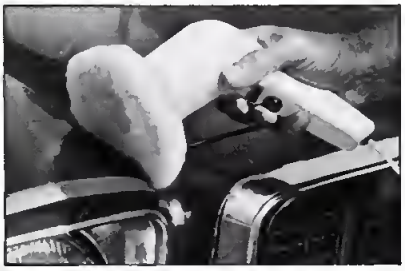
Interior cleaner easily removes crayon and grease stains from velour seats.

The cleaner is sold in 16-ounce spray bottles. The heavy-duty spray application top allows a direct stream or spray pattern. Happy Car Care is sold by direct mail for $3.95 plus shipping from Macy and Co., Box 2488, El Modena, Calif. 92669.

—*Cliff Gromer*

Portable polisher

Everybody likes to drive a clean, shiny car, but nobody likes the elbow grease that is needed to keep it that way.



Polisher plugs into cigaret lighter and comes with four different attachments.

ScrubMaster's little polisher for $19.95 is just the ticket to take the drudgery out of exterior car care. The tool plugs into your car's cigaret lighter and comes with an 18-foot power cord. Four attachments include: sponge wax applicator, buffer, wool polishing pad and tire scrubber.

The tool generates good torque for a high-gloss shine, but the small-size pads that are used mean that it takes a lot of time to cover the complete car.

ScrubMaster Electric Inc. is located at 340 Sunset Ave., Venice, Calif. 90291.—*Cliff Gromer*

Valve spring compressor

Valve jobs and head work that require valve-spring removal on cars such as VW Rabbit and Vega need a special tool because the valve springs are recessed. Cal-Van's budget line valve-spring compressor (No. 575), which costs $27, takes an adapter (No. 876-14) for recessed valve springs so you can use one compressor for both conventional and recessed spring applications.

Adapter for valve spring compressor enables you to work on recessed valve springs with a minumum of fuss.

We removed the compressor's conventional jaws and just screwed on the jaws for recessed springs. We were able to compress the springs to get at the valve keepers easily.

The adapter sells for $14 at parts stores. Cal-Van Tools is at 1500 Walter Ave., Fremont, Ohio 43420.

—*Paul Weissler*

"THIS OFFER WOULD MAKE ME BUY A POULAN SAW. IF I DIDN'T ALREADY OWN NINE OF 'EM."

Ron Hartill knows more about chain saws and how to use them than just about anyone. And Poulan is the one he uses day-in, day-out, to make his living. Because for him, no other brand matches them for dependability, durability, performance and power. And whether it's our smallest backyard model or our world-class pro models, you get smooth cutting, easy starting and the features you want most—from solid-state ignition to CounterVibe™ vibration isolation to state of the art safety features.

And even though you couldn't ask for more, Poulan's offering more: an extra chain *free* on five of our most popular saws.

Which means the saws that are hard to beat are now hard to pass up. See your Poulan dealer. And soon.

Poulan. Great saws from one winner to another.

Poulan®

Beard Poulan/Weed Eater Division Emerson Electric Co Shreveport LA 71109

Buy any 16" Poulan chain saw and get an extra $23* chain free

To receive your free 16" chain return this coupon along with the original bill of sale with purchase price of your Poulan chain saw circled plus the original warranty card found in the carton of your Poulan chain saw This coupon, sales slip and warranty card from each product may not be mechanically reproduced and are not transferable Good only in U.S.A. and Canada Void where prohibited by law Limit one chain per purchase of one Poulan chain saw with 16 inch bar length Offer good only on the following models 2300AV 16SN 2300CVA 16SN S25DA 16SN S25CVA 16SN 3400-16SN Rebate requests that are illegal or that contain materials altered in any way are automatically void Saw must be purchased between September 1 and December 31, 1982 Your request for the free chain must be postmarked no later than December 31 1982 Please allow 6 weeks for delivery RETURN TO POULAN, P.O. 725 DEPT PO, LUBBOCK, TEXAS 79491 *SUGGESTED RETAIL PRICE.

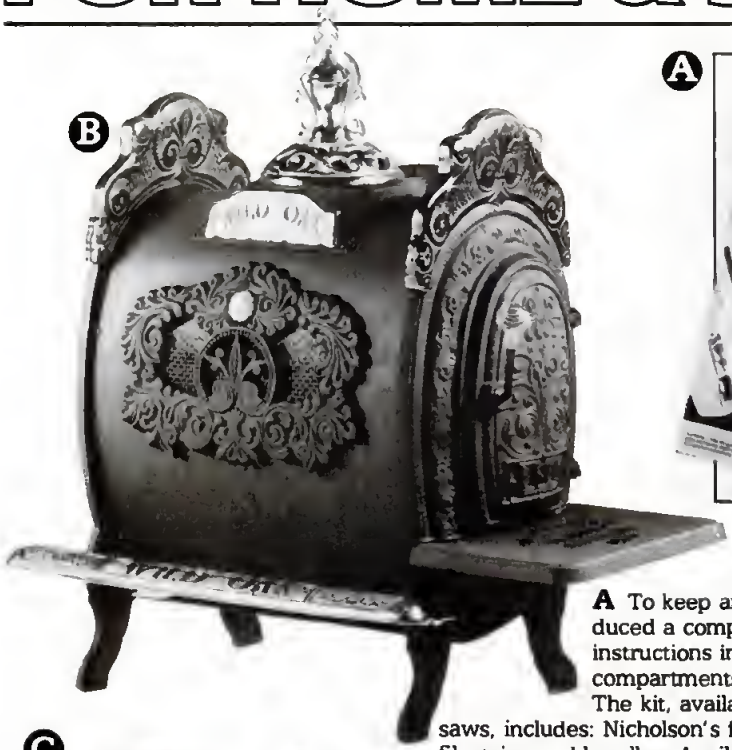
NAME _____ ADDRESS _____

CITY _____ STATE _____ ZIP _____ POULAN MODEL _____

FREE CHAIN OFFER PM

Look in the Yellow Pages under "Saws" for your nearest Poulan dealer

NEW NOW FOR HOME & SHOP



A To keep an edge on your chain saw, Nicholson has introduced a compact chain-sharpening kit. It comes with detailed instructions in a handy storage pouch with transparent plastic compartments which you can carry with you to the work site. The kit, available in three sizes for use with most popular chain saws, includes: Nicholson's file guide, depth gauge, round and flat files, and file grips and handles. Available at home centers, hardware stores and chain-saw dealers, the sharpening kit is about $18.80. It's manufactured by Nicholson, the Cooper Group, Box 728, Apex, N.C. 27502.

B This Wild Oak stove is a combination of modern technology and old-world styling and beauty. According to Webster, the cast-iron wood-burning stove has a unique baffle system which creates a spiral flame path for extra-efficient heat transfer. Additional features include a custom firebrick lining, strengthened with stainless-steel fibers, and a window which permits closed-door, air-tight burning while you enjoy the fire. The Wild Oak stoves are $975 to $1,075, depending on the options selected. They're from the Webster Stove Foundry, 1827 South Kingshighway, St. Louis, Mo. 63110.

C This portable electric circulating heater from Patton Electric Co. Inc., Box 128, New Haven, Ind. 46774, doubles as a cooling fan in warm weather. It's equipped with a five-function control, a "set and forget" adjustable thermostat, a cord storage area and a signal light. Though lightweight (under 4 lbs.) and measuring 7¼ × 9 ¾ × 11½ in., this attractive accessory provides the user with a choice of 750 or 1,500 watts for heating. This Heater Plus Fan, HF-15, sells for under $50 at appliance stores.

D Two new space-saving shelving accessories let you utilize kitchen cabinet space more efficiently. One is a revolving pantry shelf kit with five rotating shelves which are adjustable in height and self-centering. Five back-of-the-door, basket-type storage units, whose heights can also be adjusted, come in a second kit. These units mount with snap-on clips to permit easy removal for cleaning. According to Merillat, both units are nonwarping and extremely rigid. The 18-in. revolving shelf kit is $165; the 24-in., $195. The door storage shelves cost $58 and $61, respectively. For information, write to Merillat Industries Inc., 2075 West Beecher Rd., Adrian, Mich. 49221. PM

True Value HARDWARE STORES®

fix·up values

"The folks at True Value can show you over 1300 ways to trim expenses on home improvements, car care, housewares, energy-savers, paint and decorating needs. It's all in the new FALL SHOPPER circular. If you haven't got a copy, ask for it now at your True Value Hardware Store or Home Center."

Pat Summerall

Master PLUMBER **Washerless Faucet**

Chrome-plated brass centerset lavatory faucet **27.95** With pop-up **32.95**
Single lever chrome-plated brass kitchen faucet **29.95** With spray **36.95**

DURACRAFT Quality Vise

Heavy-duty 4½" vise has swivel base, smooth operating chrome steel lead screw, 2 nuts, replaceable jaw faces. HDV4 **23.95**

kwikset Special Offer

Receive a **free** entry lockset when you buy the 880 heavy-duty single cylinder deadlock with 1" steel throw-bolt. 891B Both **14.88**

Imperial Double Eagle™

"Big Horn" lock back knife has large-size 3¾" rust resistant blade, brass bolsters, laminated handle. 4815S **12.88**
Leather snap-sheath only 4800S **3.99**

TRI-FLOW Lubricant

Multi-purpose 3-oz. aerosol lubricant with Teflon penetrates to reduce friction, prevent rust and free frozen parts. 13000 **1.99**

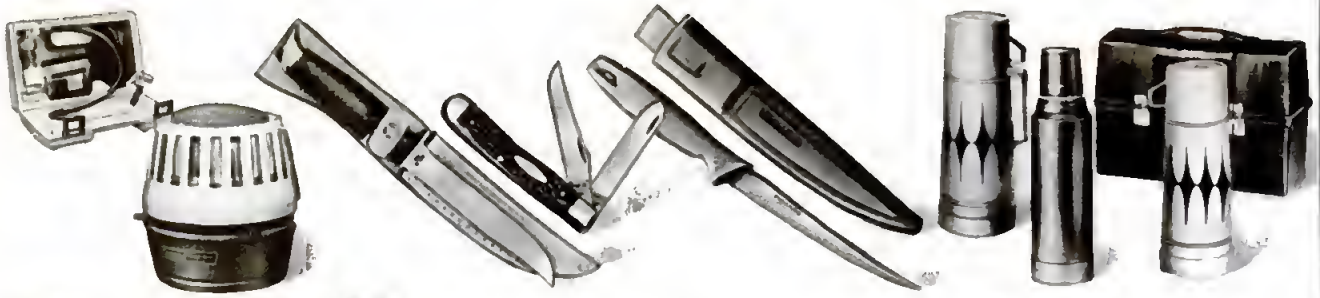
True Value HARDWARE STORES

2 for 1

With this coupon get 2 keys duplicated for the price of 1! Single bitted only. Limit 1 pair per customer. Offer expires October 30, 1982.

TEAR OUT AND SAVE THIS 8-PAGE SHOPPER

True Value HARDWARE STORES®



Coleman Power Pair
Inflata-All® plugs into lightar, pumps flats fast. 2239D641 . **32.88**
Portable 5000 BTU catalytic haatar gives hours of warmth, without flama. 5138708 . . . **47.88**

CASE Sharp Combo
Tru-Sharp surgical steel blades hava glaze finish & polished edges. Pick trapper pocket knife with bone hendla or 5" huntar's with sheath. 6207/3165SSP . **19.99**

FISKARS Sharpens
Sherpen this 6" filet knife anytime with its built-in sharpener in a shaathl Surgical stainless steel bleda ie dishwaehar safe, may be worn or stored. 6290 . . . . . **9.99**

Aladdin Store 'n Pour
Vanguard® qt. thermos. 430 **4.44**
Virtually indestructibla all steel qt. vacuum bottla. A944C . . **19.99**
Workmen's kit holds man-size lunch, qt. bottla. 5430 . . . . . **6.98**

Do·it·right with savings

Make your headquarters for indoor and outdoor home care one of over 6,000 True Value Hardware

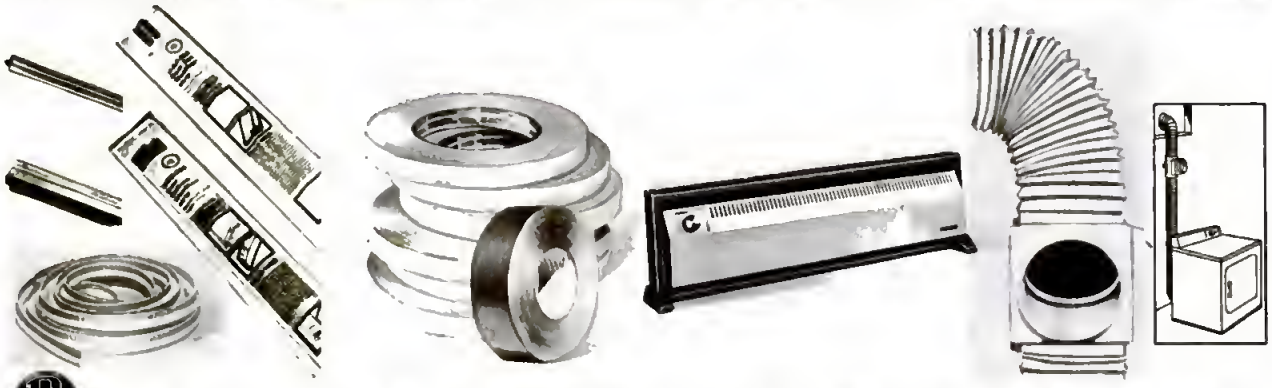
MORTELL Sealers
A Your choice 1" x 45' or 2" x 25' weatharstrip tape. TT45/25-2 Ea. **1.89**
B Unroll pliable 45' caulk cord and prass into place. Won't harden. F4 . . **1.59**

md Stop Cold
C Seal-O-Matic™ 36" door bottom blocks cold whan door is closed **7.77**
D Nu-Koil vinyl end eluminum 17' waatharstrip cuts drafts. . . . **2.99**

3M Weatherstrip
E 10' tubular or (12) 1' butyl rubber strips . **1.55**
F 15' flue tape **2.88**
G V-seal strip. White/brn. 90' . . **14.99** 17' . . **3.77**
H 30' claar tape . . . **1.99**

Frost King Cover
Outdoor air conditioner cover of "winterized" plastic is elastized for a snug fit. AC2 . . . . . **3.44**
3/8" x 17' whita adhesive foam tape. L341 . . . . **88¢**

Edison® Heater
Pulls in cold air and discharges fan-forced hot air to heat room. Thermostat controlled with 2 heat settinge for diffarant room sizes. 324036 . . . . . **39.99**

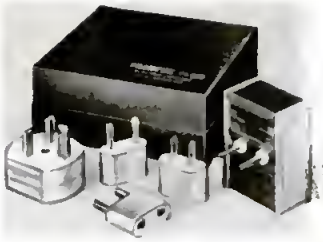


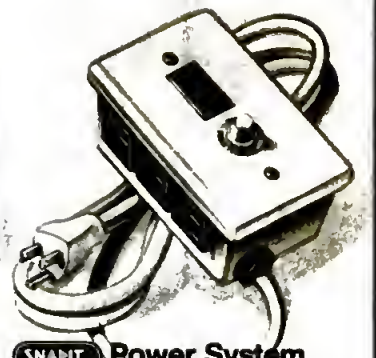
DENNIS Weatherstrip
Install a barriar againat dust, drafts. 36" triple seal vinyl and elum. door sweep. 905 . . . . **2.77**
17" Innerseal strip. BIS 17 . **4.88**
Alum. & vinyl door set. 79-V **7.89**

Tip Top Tapes
Stock up now and save on 60-yd. masking tapes. C1221-4 3/4". **49¢** 1". **89¢** 1½". **99¢** 2" . . **1.39**
Heat-rasistant 2" x 60-yd. duct tape seala leaks. R92T **4.44**

INTERTHERM® Softheat™ II
Deluxe portable baseboard heater safely circulatas comfortabla hot water heat wherever warmth is needed. 750W unit has built-in tharmostat. NP750 . . . . . **79.99**

Lambro Econo-Mizer
Turn the clothas dryer into en extra anargy eourcal Divarte moist, warm air into your homa in wintar. Closa the velva for normal air flow. HM1700 . . . **5.88**





DURACELL Alkaline
Keep a reedy power supply on hend. Choose 9V, 2-pack "C" or "D." MN1604B/1400B2/1300B2 . . **1.99**
4-pack "AA." MN1500B4 . . . **2.79**
2-pack "AAA." MN2400B2 . . **1.59**

EVEREADY Energy Source
Keep your home end shop in top running order with batteries built to lest! Shop e complete selection of general purpose end alkaline Energizer* batteries.

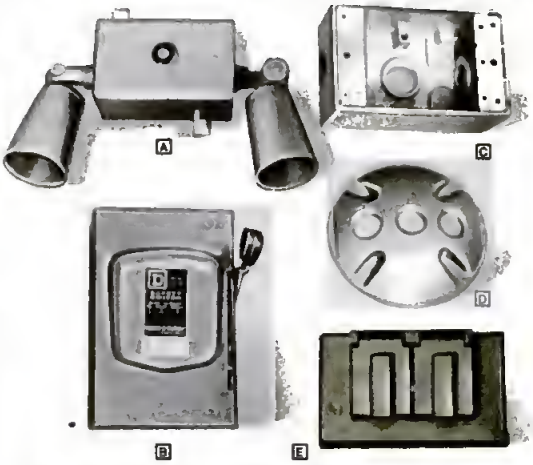
FRANZUS Travel Power
A must for foreign travel, 5-pc. kit converts 220/240 foreign voltage to 110/120 U.S. for appliances up to 1600W. With travel case. CA1600 . . . . . **19.99**

SNAPIT Power System
Safely traneforms 1 outlet into 6. Mini-breakar protacts ageinst overlosd. Shock-safe, unbreakeble houeing for wall mounting or portable use. 48725-6 . . **11.88**

now thru Oct 30

True Value HARDWARE STORES®

Stores. Look under "Hardware" in the Yellow Pages.



TRINE SQUARE D COMPANY Weatherproof Wiring
[A] Night Guard dusk-to-dewn light uses 2-par 75W or 150W lempe. 10840-G **18.89**
[B] 30-amp indoor safety switch. D211N **14.99**
[C] Rectangular 3-outlet box cover. 10270L . . **2.29**
[D] Round 3-outlat box cover. 10383 . . . . . **1.69**
[E] Die-cast duplex enep cover. 10245B **1.86**

CAROL Curly Q™
Replece worn cords on lemps, fane, eppliences, with 18/2 retractabla axtension, 12' recommended usage. Whlte, brown. UL listed. 6002/8 . . . . . **3.49**

SNAPIT Cut 'n Strip
Great new idee for the do-it-yourselfer! Streamline repeirs on eppliences, cars, electricale with the tool that cuts end strips wires to 14 AWG . . **6.99**

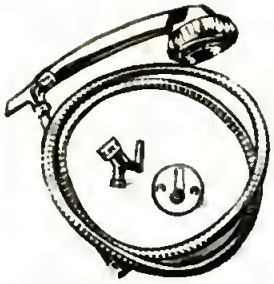
ITT Brite Beam
Ideel for lighting tennis courts, driveways, patios, walks, 300W quertz lamp sheds mora light then two 150W incendeecant lamps. R500Q2 . . . . **28.99**

DUR-O-PEG TV Values
VHF/UHF/FM entenne. . **19.99**
Universal treneformer. B4644 **1.89**
Cable wall plete. B4647 . . . . **1.79**
75' coax TV cable. B4640 . . **8.49**
Coax 2-way splitter. B4646 . **2.89**

American Fluorescent Light
Illuminate workshop erees with ell steel 48" repid-stert light. Completely wired, with two 40W lemps, 3-wire cord, plug end 24" hanging chain. 240SPLK0 . **13.99**

GE Miser Floodlight
For home security or decorative lighting, the "Miser" offers energy-saving outdoor illumination. Choose 65W or 120W lamp. 65PAR/120PAR/FL/WM Each . . . **2.99**

EDISON LIGHTING Colonial
Spruce up the porch or garden with mette bleck finished 60W lanterne. Choose semi-ceiling, well or poet-mount fixtures. E3226/3626/3726-9 Each . . . **16.66**

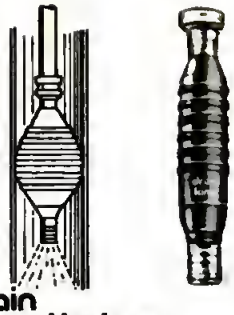


Add An alsons

Rapiace en old showerhaad with push-button Personei Shower™ that can be hung or hand-haid. Has weii mount, swivel connector, 59" hose. 410PB-PK **17.95**

SaverShower

Save up to 75% on hot watar biils! Deiuxa showerhead with throttia valve iets you adjust flow from fuil spray to trickie. SS2C **8.95**
Standard SaverShower. SS1C **5.99**



drain king Unclogs

Unclog sinks, tubs, toilets, more with water power, not chemicals. Attachae to hose, expande to fit pipe, than jets of water dislodge clogs. For 1-6" drains. 186 . **5.99**

True Value Sump Pumps

Cast iron ⅓-hp pedestal, overload protected. TVSPV500 . . . . . **59.95**
½-hp upright. TVSPV800 . . . **79.95**
⅓-hp eubmers. TVCDU790 . **72.95**
½-hp submers. TVCDU800 . **88.95**

Piping hot values now

The newest, finest fix-up products plus expert how-to advice give you

Fulflo® Purify Water

installi undar the sink for better tasting water. Carbon filtar removes odors, sand, rust, elgaa. With hardware. WT6 . . . . . **36.95**
Extra cartridge. RWT-3 . . . . **6.99**

Master PLUMBER Faucets

A Cast in brass with bright poliehed chrome finish. Easy ineteii centereet faucet repiaces lavatory mount. 201-14MP . . **12.95**
With pop-up. 80MP. **18.95**
B 2-handle chrome polished kitchen deck faucet. 261-20MP **15.95**
With apray. 40MP . **19.95**

True Value Disposer

C Long-lesting bledae chew up tough garbage, even bones, fast. Continuous feed operation, is sound insulated for quiet operation. Resists jamming and corroaion. ½-hp unit hae quick-mount installetion. TV103 . . **49.99**

Steel Sinks

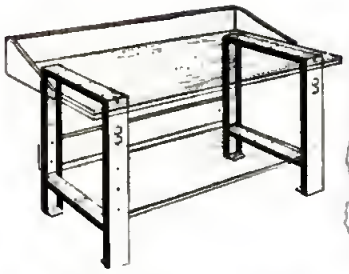
Stainiass staai 1-pc. unit hae pre-drilled faucet holes, installs fast.
D 2-bowl. 533E . . **35.95**
Single bowl. 522E **29.95**
E Utility and ber sink. K1559B **39.95**

plaskolite Shower

Hi-impact staii won't rust or leak, installs aasily. includes shower head, curtain, grab bar, faucet. 32x73¾". SS1000 . . . . . **119.95**
High-base stail. SS2000 . **159.95**

NEMCO PRODUCTS COMPANY Dryer Kit

Fuily-assembied dryar vent kit has aluminum hood, duct, tansion-type clamps. Easy to install.
4" diam. 5' long. AF45K **5.49**
4" diam. 8' long. AF48K . . . **6.99**

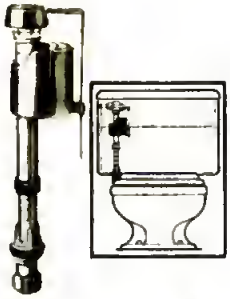


Steel City Bench Legs

Set of sturdy 18-gauga stael workbench legs with hardware is aii raady to assambia. Has handy spaces for outlats, tools. Top not included. WB-1R Pair . . . **12.88**

Yale Secures It

Powerful 4-pin tumbiar padiock hes 1¾" wida solid brass case, hardened staai duei iocking shackie. Ruet-resistant. 2 keys included. V7314 . . . . . **9.49**



FLUIDMASTER

Non-corrosive FLC valve puts en end to toilat leaks and noises without float-ball or watar prassure problems. Fits most standard tanks. 400A **4.99**

MELARD Auger

Drein-cleaning tool bores sasily through clogged pipes to free obstructions. ¼" spring steel wire will not snag or catch. Easy to use 15' line. 1761 . . . . . **6.99**

BY PRICE PFISTER **Valve Values**

Replace rusted or leaking valves with solid cast brass gate valva. Handles to 200 lbs. water pressure. ½" gate valve. V05-020 . **2.99**
¾" gete valve. V05-030 . . . . **3.79**

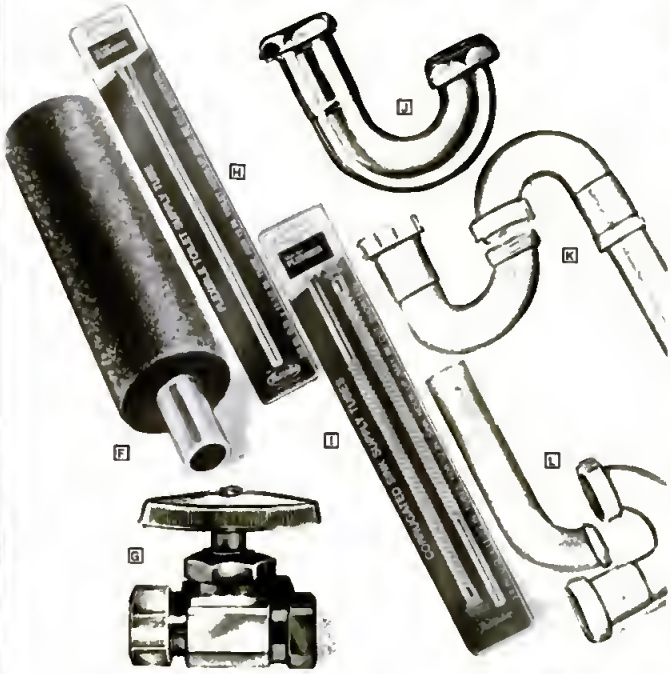
"Don't forget to pick up a copy of True Value's new FALL SHOPPER circular."

thru Oct 30

MasterCard VISA

professional results when you do-it-yourself. Just say "charge it"

True Value HARDWARE STORES®



Master **PLUMBER**

Pipe Insulation

F Slip polyethylene foam on pipes to stop heat loss, sweating, freezing, reduca fuel costs.
For ½" copper pipe. 338C50M . **2.99**
For ¾" copper pipe. 338C75M . **3.49**
For ¾" steel pipe. 338C100M . **3.99**

Water Supplies

G ½ x ⅜" compression streight valve for iron pipes. MP20. **3.49**
½ x ⅜" angle valve. MP18. . . **2.99**
H 12x⅜" toilat supply tube. **1.59**
I 2-pack 12x⅜" corrugeted supply tubes for sink. MP60 **3.99**

Sink Repair

For repeirs or remodeling, opt for corrosion-resistant parts.
J Chromed "J" bend. TV1PC **2.99**
K Plastic "S" trap. TV66-3. . **3.99**
L Plastic "P" trap. TV940. . **2.49**

Check our low prices!

National Ornamental

Sturdy antique black bracket adds stylish support to bookshelves, hanging plants, curio display. 8x5½". 152 Each **2.77**
10x7" bracket. 152 Each . . . **3.19**

KinderGard Childproof

Keep poisons and sharp items out of reach of small children with self-locking sefety letch. Extre strong hook design secures cabinets, drawers. 3-pack. 103 . . **2.49**

NOVO Sense the Night

Automatic night light "senses" night and day to turn on and off; varies the output of light proportionetely to the degree of darkness. Uses 7W bulb. NL300. **2.88**

True Value Energy-Saver

Energy-efficient water heaters pay for themselves in savings on fuel end installation costs. Thick foam insuletion retains heat, uses less energy, gives you hot water when you want it! Your choice of 30-gal. natural ges or 40-gal. electric water heaters. 5-year warranty. Each **114.95**

Wet-Dry Vacuum picks up everything from water to nails. With 8'x1¼" hose, 1½" wand, 10" nozzle, squeegee shoe end plastic dolly. 6-gal. cap. MM600-6. **54.25**

Portable Workbench is first with movable vise! Holds materials to 27" wide, folds to 5" flat. Has tilt adjustment, 5 open positions, 4-position legs and tool holder. MM1000 **49.99**

12-Piece ⅜" Drive Socket Set, forged from alloy steel, contains 7 sockets, ratchet, ⅝" spark plug socket, speedar disc, more. SAE or metric. MM812P/M Each set **10.99**

Brazing Torch Kit, with fuel mixture feature, lets you select right fuel for each job, from propane to high-temp Mapp® fuel. Has tips, regulator, rods, 16-oz. tank, and more. MM3600 **16.95**

True Value HARDWARE STORES® Professional

YOUR CHOICE 6.99 each

Professional Tool Chests have tough "strongbox" construction with sturdy solid steel throughout, reinforced tops, full-length hinges and compound drawer slides. Stacked or used separately, they are big enough for a workshop full of tools. Keyed cylinder locks and baked-on enamel finishes for years of use.

A **6-Drawer Chest** has 3 large and 3 smaller drawers, 4-section lift out tray. 15x26x13½". MM1806 **92.99**

B **3-Drawer Roller Cabinet** has large storage area, brakes on two casters. 33½x26½x18". MM1903. **117.99**

C **Flat Top Tool Chest** with 3-section tote tray, socket divider plus padlock eye. 20" long. MM920. **12.99**

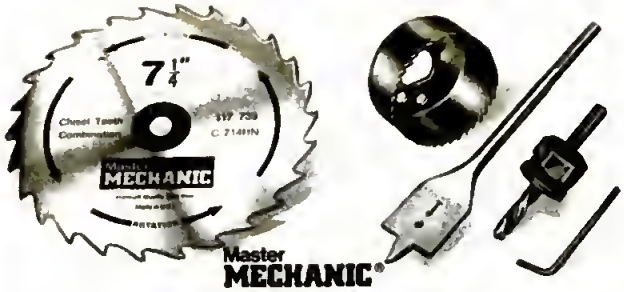
D **7" Diagonal Pliers,** forged from alloy steel, is one tough tool for heavy-duty jobs. High leverage diagonal cutter is electronically hardened for superior strength and durability. Forged rivet for tough, precision fit. MM40-7C

E **2-In-1 Plane** uses Pro-Sand and Pro-Cut grater blades interchangeably to plane, shape, shave, file and sand wood, plastic, soft metal, and particle board. Pro-Sand blade outlasts sandpaper 100 to 1, changes in a "snap." 80570

F **Professional 24" Aluminum Level** has 6 unbreakable vials, 4 plumb and 2 level, sealed against dirt and moisture by heavy glass windows in die-cast frame. Convenient measuring rule on top in both English and Metric. 10106

G **Professional Screwdriver Sets** feature chrome vanadium steel blades for tensile strength without abrasion, and precision ground tips. Large comfort grips fit your hand for greater turning power. Your choice basic 5-pc. set with 3 slotted and 2 Phillips screwdrivers or 4-pc. set with commonly-used Phillips screwdriver sizes. TS5, TS4P. Each.

H **3-Pocket Tool Pouch,** handcrafted of genuine top-grain cowhide, is as practical for the do-it-yourselfer as it is for the professional. Features easy-access main pocket for large tools, 2 plier pockets, 2 side slots for long screwdrivers, friction tape sling, knife snap and a 16" steel tape pocket. With extendable belt slots. Overall size: 8½" x 9¼". MMLP438



7¼" Combination Blade with hard chrome finish will rip, crosscut and miter in soft and hard woods. Chisel tooth makes it ideal for framing and cutting of heavy woods. 117739. **2.99**

4-Pc. Holesaw Set cuts wood, plastics, composition materials for lock/deadbolt installation. Made of carbon steel, set has 1" woodbit, 2⅛" holesaw, mandrel, wrench. 397760. **6.99**

Mini Hacksaw handles any job a big hacksaw can do...and more! It's designed to adjust to work in close quarters. Heavy-gauge molded handle. Uses regular blades. MMHF10. **1.99**

6-lb. Splitting Maul has a drop-forged hand-ground steel head fitted to a fire-hardened hickory handle for strength and balance. Bites deep into wood with light ease. MMS6MA **11.99**

quality tools

Master® MECHANIC hand and power tools are sold exclusively by True Value Hardware stores and carry this customer satisfaction policy: If any Master MECHANIC tool fails to perform as you would reasonably expect, return it to any participating True Value Hardware or Home Center for immediate replacement.

I Home Safety Kit is designed for use in the workshop and yard with goggles that fit over glasses, a non-toxic dust respirator, and earplugs. Protects user running power tools, chain saws. MM3.

J 17" Claw Ripping Bar is high carbon steel forged for durability and strength. Has polished ripping blade, 3 nail pullers to extract deeply embedded nails and a 90° claw for tight spots. MM232.

K 12" Combination Square gives the best angle on carpentry work. Markings are graduated by 8ths and 16ths on one side, 16ths and 32nds on other. Die-cast beam has level inscriber. 10245

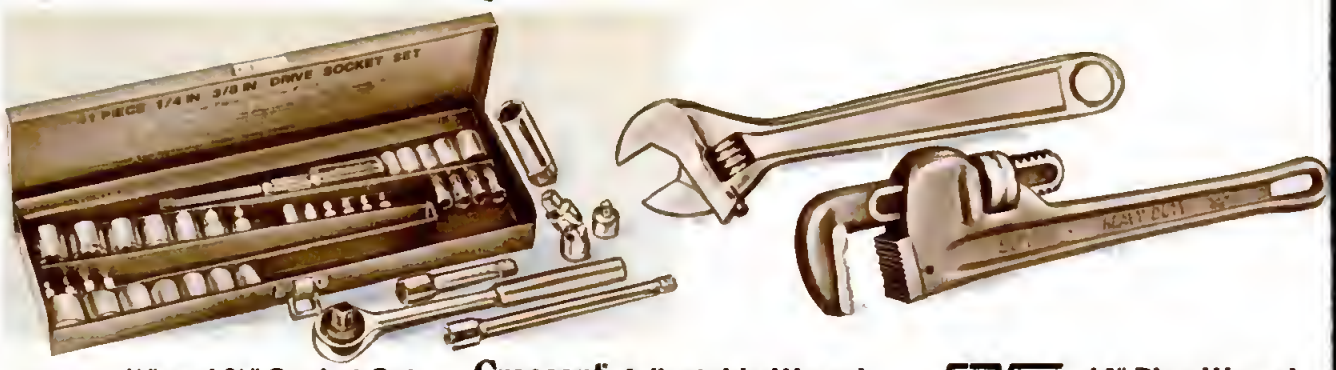
L 7-Pc. Drill Bit Set is high speed steel, heat-hardened for maximum strength. Hardened power points bite deep for smooth, one-stroke drilling. Drill bit sizes range from 1/16" to ¼". 121590

M Professional-Quality Hammers have highly polished striking heads, triple wedged handles in tapered eye. Handles are select, flame-treated hickory. Choose claw or ripping hammer. B16MM/RMM

N Single Bit Axe, with its balanced hickory handle, is light enough for easy use, heavy enough to bite deep. Drop-forged from high quality tool steel and hand-ground to keep a keen edge. 35SBTT.

O Precision Wood Chisels make fast work of shaping wood or composition. 3-pc. set has ½", ¾" and 1" blades, austemperad and bevel-ground to keep keen cutting edge. Hi-impact grips. 300MM

P Professional Power Tape has self-adjusting and hook for accurate measuring. 25'x1" no-seam epoxy-coated blade housed in rugged, Cycolac® chrome-plated case. With removable belt hook. MMP425.



National ¼" and ⅜" Socket Set

Streamlina work on appliances, motors, cars with high-quality 41-pc. SAE and matric set. Has 33 sockets, retchet, extensions, spark plug sockat, more in metal case. C84-41AFM . **12.99**

Crescent Adjustable Wrench

No tool box should be without this 8" alloy steel wrench. Drop forged and heat treated for toughnass and durability. Completely chrome-plated to resist corrosion. AC18V. **6.99**

ServVess 14" Pipe Wrench

Drop forged upper and lower jaws with full floating hook jaw assure instant grip and aas relaase. Won't jam on pipes. I-beam handl has handy hang-up hook. 514S. **9.9**

True Value HARDWARE STORES®

fix-up values

B·D ⅜" Reversing Drill

A 0-1200 rpm variable speed drill has triggar control speed lock, reversing switch to remove screws and jammed bits. ⅜" steal and ¾" hard-wood cap. **33.33** less $5 factory rabata. 7190

B·D Dual Action Sander

B Variable ⅓ sheet sander has orbital action for fast material removal, straight line sanding for fina finishing. Flush sands on 3 sidas. Only **34.50** less a $5 manufacturer's rebate. 7436

B·D 1¼-hp Router

C Routs, grooves, trims and decoratas wood, plastics, compositions. Calibrated in 1/64" incremanta for accurata dapth, ramovabla chip deflector. **44.95** less $10 factory rebete. 7614.

WEN Wet Stone Machine

D An idaal way to sharpen, grind and hona because wet stona alliminatas overheating and loss of metal tamper. Built-in guidas, 4x180" grit wheel, diaphragm pump system. 2900 **64.99**

SKIL Sandcat™ Sander

E Combinas tha aase of control of an orbital sandar and fast removal and low vibration of a belt sandar. Ball and needla bearing construction, locking lever, plus 5 belts. 593. . **48.49**

SKIL. True Value Exclusive

F 7¼" circular saw has 2-hp motor, Vari-Torque clutch to prevent motor damaga, and aluminum guards for use with matal and masonry blades. Cuts 2⅜" at 90°, 1⅞" at 45°. 675S **44.99**

DURACRAFT 3-Speed Action

G Ball bearing drill press uses ¼-hp motor to drill through hard or soft woods, metals, plastics at 700, 1560, 3270 rpms. SP30. . . . . **99.95**

H 2" capacity drill press vise. DPV2. . . . . **9.99**

DURACRAFT High Speed Action

Bench grindara do so much—stripping paint and rust, aharpening, cleaning and polishing tools—they're aa practical for homa as for professional usa. 2-wheel dasign givas you 2 different grits at once. Adjustabla tool rests support work at proper angla; see-thru shields protect user. Direct-drive motors with permanently lubricated bearinga assure long life.

I 5" grindar, ⅓-hp. UL listed. 33-5. . . . **27.77**

J 6" grinder, ½-hp. UL listed. 50-6RX. . . **39.99**

COTTER & COMPANY, General Office, Chicago, IL 60614. 100% Member-Owned warehouse distributor serving over 6,000 True Value Hardware Members who own their own store, set their prices and reserve the right to limit quantities. Because participating True Value Hardware Stores may vary in size and merchandising policies, some may not stock all items shown. Prices may vary and are subject to change without notice. Prices expire Oct. 30, 1982

8-PAGE TEAR-OUT

PM SOFTWARE MONITOR

It doesn't matter how much money you spend on your personal computer—without the right software it is only an oddly shaped box with a keyboard. Now that the computer revolution has found its way into so many households, finding software is more important than ever before. Each month, we'll take a look at several outstanding programs for personal computers that will help you in everything from word processing to destroying on-screen enemy space fleets.

Double your type sizes

Screenwriter II is a word processing package for the Apple II computer.

Most Apple II owners quickly come up against one of the more obvious limitations of the Apple: Its character line length is only 40 columns across the screen. There are a number of hardware solutions to this problem (such as Videx's Videoterm board) which plug into the Apple and widen its screen to 80 letters across a line. But these hardware fixes are expensive—around $300 or so.

Screenwriter II is the first word processor for the Apple II which gives you an 80-column display without additional hardware. It even gives you lower-case letters for which you would otherwise need a less expensive ($50) hardware accessory. So already, *Screenwriter II* can save an Apple II'er $350 or more.

The display uses the Apple's high-resolution graphics to "draw" each letter on the graphic screen, bypassing the way the Apple usually generates its character set. The visual result is not quite as sharp as that of an 80-column hardware attachment (see photo). At a dealer's, compare an 80-column card against *Screenwriter II*'s display. If you settle for a readable, as opposed to an ultraclear display, you'll save some big bucks.

Screenwriter has the usual find-and-replace features to change words throughout a document.

But *Screenwriter* features two surprising additions—spooling and macros. Spooling allows you to have your printer working while you're still editing an on-screen version of what is being printed. Macros let you define long words, or even phrases, so that they appear with one keystroke.

Screenwriter II will keep a lot of Apples wordstruck—at $129.95 from On-Line Systems.

Screenwriter II's display (above) features two type sizes. The large type is usual 40-column size. The smaller type is 80-column done without additional hardware.

Killer 'droids

Robot Attack is one of the best of the new-style arcade programs for the TRS-80 Model Three computer.

One of the most exciting things about this game is that it talks to you—and you won't even have to buy anything additional. While it's no Don Rickles, it will shout such things as "chicken!" and "lucky" at you through your cassette recorder's speaker.

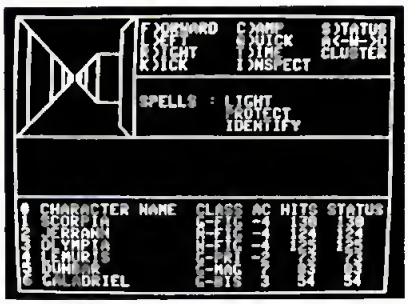
The game plays pretty much the same as the arcade's *Berzerk*. You run a little man through some maze-like rooms while being chased by robots. You control your man by keyboard.

The game is $19.95 on disc or $15.95 on cassette. It's from Big Five Software.

Adventuresome Apples

Knight of Diamonds is out, and that's wonderful news for the thousands of people already addicted to the Apple adventure game of *Wizardry*.

This is the second scenario in the *Wizardry* universe and requires that you have characters who have progressed through the earlier scenario. No dull-witted wizards or scrawny warriors will survive long in this new setup!



Knight of Diamonds is the second scenario in popular series of Wizardry games.

Like *Wizardry*, the maze is drawn in a three-dimensional view as you move through it. And the name and status of each of your characters is listed on the same screen.

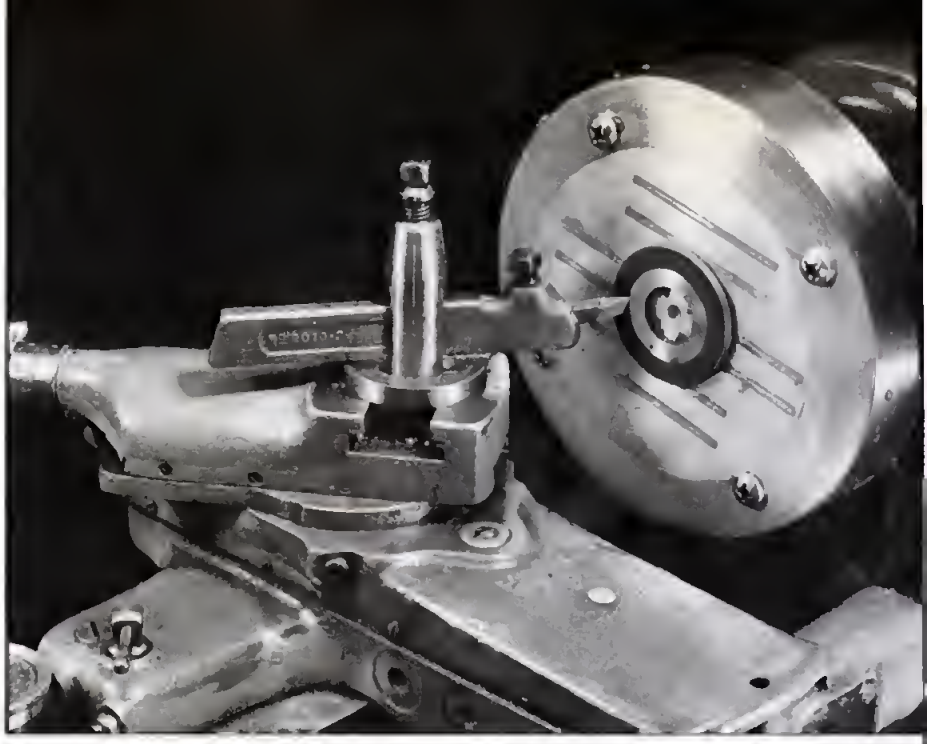
Fighting (and there is a lot of it!) involves having your six-character party cooperate in a melee of brains and brawn against all comers. And, as in the first game, even a powerful character can bite the video dust.

Knight is the best sequel we have seen to an already popular computer game. We're now awaiting the third scenario and anxiously trying to strengthen our favorite wizard. *Knight* is on disc for $39.95 from Sirotek Software.—*Neil Shapiro*

Build This Inexpensive Magnetic Lathe Chuck

Here's a clever, inexpensive way to hold oddly shaped—or very thin—workpieces that would be distorted by conventional lathe chucks.

by Walter E. Burton



Machining the impossible becomes easy when you can stick the workpiece to your lathe chuck by magnetism. Turn rings, precision spacers and tiny parts without distortion.

Doing the impossible turns on most hobby machinists—more than simply producing standard parts. Jobs like truing both faces of a steel washer to make them flat, parallel and to a precise dimension, for instance—try that on your lathe with a conventional chuck. It can be done, but most of us find we botch many parts and give up in frustration.

Of course, you are not the first to need a precision shim, spacer, or other thin but accurate turning. Pro machinists have long since developed the magnetic chuck to hold just such workpieces and make these seemingly impossible jobs easy, quick and profitable for their shops. For them, with many parts to produce and no time for elaborate setups or botched work, the cost of the tool that does the job means far less than what they can earn by having it. This line of thinking goes a long way toward explaining why commercial magnetic chucks cost so much—and why so few hobby machinists have them.

You may not want to invest the full price for a magnetic chuck, nor are you apt to find one at a garage sale. But, how about building your own for less than $15? Magnets, beefed up with pole pieces that grip with 40 lbs. of force, do the holding, and the other materials are mostly scrap. What's more, almost all of the machining can be done on your lathe. A milling machine helps cut the slots in the faceplate of the magnetic chuck, but you can do this work by hand or with a drill press.

The only thing your magnetic chuck won't do as conveniently as a commercial model is to let go of the workpiece when the machining is finished. Professional versions have a system of levers to move their magnets, thus reducing the force holding the workpiece to the chuck. Yours won't do that but, while you may have difficulty pulling a workpiece off the magnetized surface with your fingers, pushing it away from the magnetized part of the chuck face with a wood stick makes it easy.

Other magnetic chuck-machining tricks make it even easier and help keep ferrous chips from sticking to its workface.

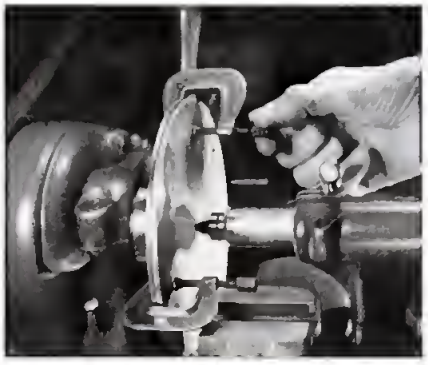
With this type of chuck you can make washers, rings, shims and other shapes that must be held to close tolerances.

A magnetic chuck can hold thin ferrous workpieces for your lathe drill press or surface grinder. By making a wooden fixture for it, you can clamp the chuck to a workbench to hold parts for hand finishing, assembly, filing, and even engraving.

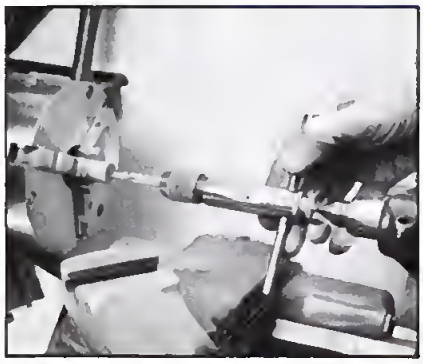
Using a magnetic chuck in a lathe calls for firm mounting on the spindle and the slowest practical turning speeds. Sometimes, rotating the spindle by hand after disengaging

(Please turn to page 78)

Circle cutter with extended cross bar removes heavy aluminum disc from bottom of discarded pot to form chuck faceplate.



Center front plate over back plate and clamp so spacer mounting holes can be spotted, punched and drilled accurately.

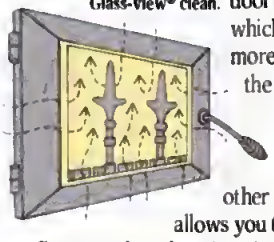


Thread each end of the spacer hole ¼-20 for plate-mounting bolts in back end work-securing fingers on front plate.

WHEN YOU COULD HAVE A RUSSO GLASSVIEW WHICH ACTUALLY BOOSTS YOUR HEAT, INSTEAD OF LOSING IT?

The Patented Russo Glassview® Gives you 25% More Infrared Heat Than A Closed Steel or Cast Iron Door. With any other stove you pay dearly to sit cozily and watch the fire.

Air-flow design keeps Glass-view® clean.



When you open that door a draft is created which sends 60% or more of your heat up the chimney.

The patented Russo Glass-view,® on the other hand, not only allows you to watch the flames without heat loss, but because this special glass is such a great conductor it actually gives you 25% more infrared heat than a stove with a closed cast iron or steel door.

The Russo Heat Exchanger Will Heat Your Entire House Without Blasting You Out of The Living Room. If you really fire up an ordinary wood or coal stove it will get so hot in the immediate area that you'll be uncomfortable. But since the Russo heat exchanger draws heat from the hottest part of the fire, and then circulates heat throughout the house, you'll be as comfortable in the living room as in the hall.

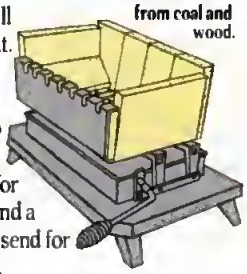
Burn Wood Or Coal Without Modifications. (On 3 models). Russo has America's only custom designed, poured fire-brick liner. Its

benefits are: 1) It can withstand more than 2600° F., and can therefore burn coal without add-on equipment. 2) Its custom design allows it to closely hug the heavy plate firebox, and this allows a better heat transfer. 3) Its tapered shape guides the ashes down to the shaker grate naturally, thus promoting even burning of the live coals, or embers.

Another aid to even burning and the elimination of dead spots is the combination of a cast iron shaker and an external shaker handle.

So there you have it, a stove that lets you have your cake and eat it. You can watch the fire and gain heat instead of losing it. You can burn wood or coal without modifications. And you can crank it up enough to heat the entire house and still sit right in front of it. It's everything a stove ought to be. You really ought to take a look.

Custom-designed firebrick liner delivers maximum heat from coal and wood.



See your dealer for more information and a first hand look. Or, send for our 4-color catalog.

Russo Manufacturing Corp. *PM-10*
87 Warren Street
Randolph, Mass. 02368

Enclosed is $1.00. Please send me your full color, 12-page catalog and the name of my nearest Russo Glassview® dealer.

Name_____

Address_____

City_____

State_____ Zip_____

Send check or money order. Do not send cash. Catalog will be mailed First Class.

Russo

THE HOUSEWARMING STOVES WITH THE GLASS-VIEW®

Made in U.S.A. Patents and other Patents Pending. © 1982. Russo Mfg. Corp.

MAGNETIC LATHE CHUCK

(Continued from page 76)

the power drive produces the best work.

To work on brass, aluminum, plastic or other nonferrous material, simply cement the workpiece to a thin sheet of steel or iron. Backing pieces about ⅛ in. thick do this well. Adhesives like cyanoacrylates hold hard and then let go with a little carefully applied heat. This method also works well for small ferrous parts hard to center on the chuck without a backing piece.

While a magnetic chuck holds parts firmly for machining, it also collects most of the chips and holds them too. You can brush them off with a stiff bristle brush or wipe them away with a cloth or paper towel. Dampening the cloth or towel with water or thin oil may help snag the chips much as wetting a paper towel helps to pick up tiny glass fragments. Tape, sticky side out, can also remove chips and metal dust from the magnetized surface. Use a thin sheet of kitchen sheet plastic to help keep chips from sticking directly to the face of your magnetic chuck. While not greatly reducing the chuck's holding force, two layers of thin plastic also make it easier to remove a delicate workpiece.

Aluminum fingers, held to the face of the chuck with Phillips screws or bolts can be adjusted to keep the workpiece from slipping as you machine it. Try taking the lightest possible cut to minimize any tendency for the part to tip. Flat workpieces like washers are the most suitable. Having a large area in contact with the chuck face reduces any tendency to tip or shift.

Sudden tool movements can cause a workpiece to shift, even if precisely trapped by the stop fingers. So will a cut that attempts to remove too much material in one pass.

When holding a very thin workpiece, make certain it is neither warped nor bent before you start machining it. The force of the magnets can flatten out the warp which will show up again when it is removed from the chuck after machining.

Grit and chips from grinding operations can damage the surface of the magnetic chuck as well as the lathe bed ways. Catching them with a cloth or piece of aluminum foil—take care to keep it from becoming tangled in the machinery—keeps grit out of machine slides and bearings where they could cause rapid wear.

Four ceramic magnets ($12 from Edmund Scientific, 101 East Gloucester Pike, Barrington, N.J. 08007), a 6½-in. aluminum disc that had not found a previous use in the shop and the bottom of a heavy aluminum pot became basic chuck parts. If the aluminum had not been handy, brass or steel could have been used for the discs forming the front and back plates of the chuck. An adapter to fit the spindle nose on my 9-in. lathe was turned and threaded from brass, but cast iron or steel would do as well.

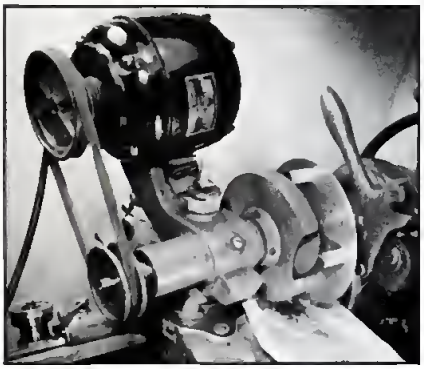
Center the back plate on the adapter and drill the three mounting holes through the plate and into the adapter with a No. 7 bit. Thread the adapter holes ¼-20 and enlarge the holes in the plate to a ¼-in. diameter. Use thread-locking compound on the bolts securing the adapter to the back plate.

Cut four 1⅛-in.-long spacers from ¾-in.-dia. mild steel rod. These separate the front and rear plates to make room for the magnets.

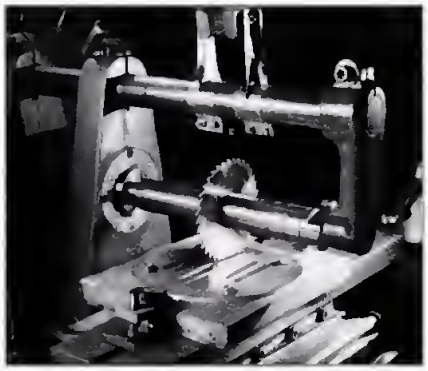
Center drill each spacer lengthwise with a No. 7 bit and tap each end of the hole ¼-20 for ⅝-in.-long bolts. Center the 6¾-in.-dia. front plate over the 6½-in. back plate and clamp them firmly so you can drill four ¼-in. holes about 90° apart ¾-in. in from the edge.

Mount the four spacers on the

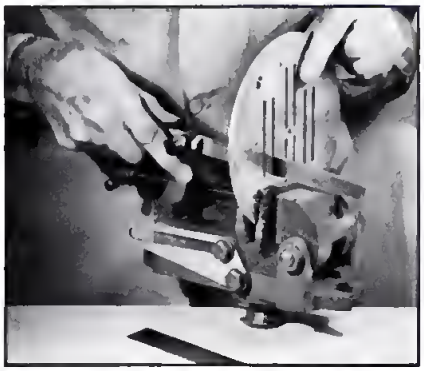
(Please turn to page 80)



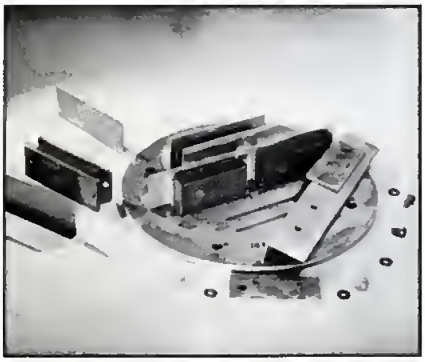
Toolpost grinder on lathe trims spacers to equal length. Aluminum foil under cup grinding wheel keeps grit off lathe bed.



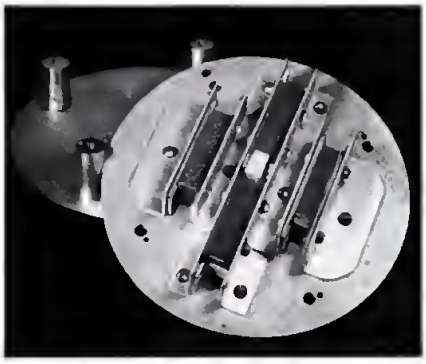
Saw blade in milling machine cuts slots in front plate for magnet pole pieces so they can grip workpieces with maximum force.



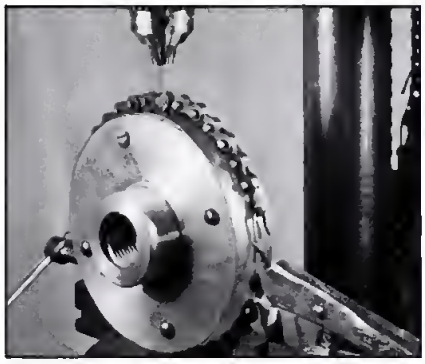
Flat file squares off the ends of each slot. Epoxy cements pole pieces in place and fills gaps to finish faceplate flush.



Angle strips secure pole pieces and magnets on faceplate. Screws hold pole pieces which engage slots in faceplate.



Wooden block separates ends of center magnets, keeps them from shifting under centrifugal force when chuck is turning.



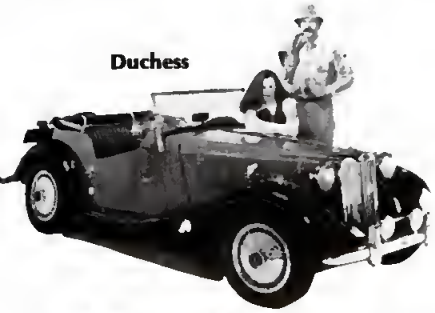
Clamp sheet-metal band enclosing magnets with chain pliers while drilling holes for self-tapping screws that secure it.

Discover 175 FULL SIZE Sports Cars You Can Build from Kits

See All The Kit Cars • All The Manufacturers • 196 Colorful Pages • 600 Photos

For the low-price of a mass-produced compact car, you can own an authentically detailed MG roadster like this *Duchess*. It's just one of the 175 full-size antique, classic and modern sports cars you'll find in the all-new 1982 *Complete Guide to Kit Cars*.

Duchess

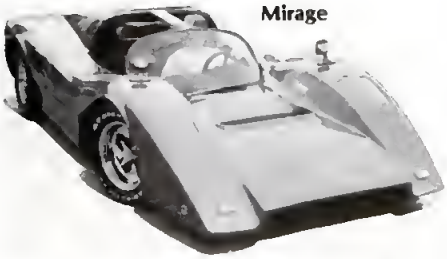


The 'kit car' concept is not new. For years custom coach builders have been designing stylish new bodies like this *Jaguar XK-120*. Manufacturers all over the country sell them as full-size bolt-on body kits designed for easy home assembly.

Jaguar XK-120

Be the envy of all your friends, in this mid-engine Can-Am racer called the *Manta Mirage*. Anyone can imagine James Bond behind the wheel of a car like this, but for one-quarter the price of an original . . . you can too! This giant buyers guide is filled with all the facts, photos and info you need and want most.

Mirage



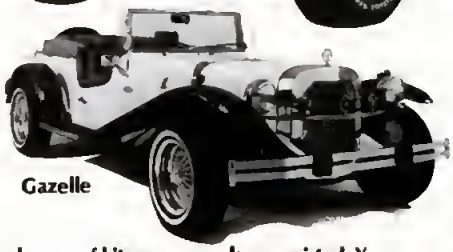
See everything from economical VW roadsters to sizzling mid-engine V8s. The pages of *The Complete Guide to Kit Cars* are packed with serious handcrafted autos like the *Hall Pantera*. Virtually all sell for a mere fraction of their apparent value. And most require no special tools or mechanical ability to assemble.

Pantera

See 4 different Ferrari replicas including the Dino and the 308-GTB.

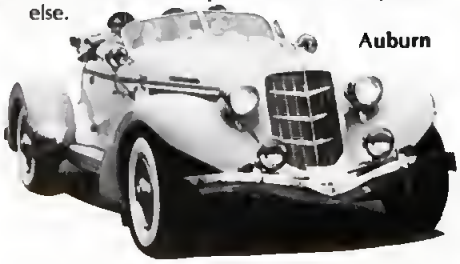
Kelmark GT

Gazelle



See dozens of kits you never knew existed. You may already recognize the popular *Gazelle* roadster., But, did you know that there are more than 4 other Mercedes look-alikes including a 450SL, a 540-K, and a 1927 touring replicar. This comprehensive annual reveals dozens of models you won't find anywhere else.

Auburn



Make money while you're having fun. Completed *Auburns* and *Cobras* like this sell for $30,000 or more. But, you can assemble your own for a fraction of that price. Thousands of readers already have. You can too! *The Complete Guide to Kit Cars* shows you everything you need to get started.

Cobra

Now Available ... Kit Car Monthly Newsletter. Hundreds of used kit car bargains. Manta, Gazelle, Sterling, Kelmark, Cobra, MG-TD, more! New kit intros every month.

Order Both. Everyone Does!

Get the OFFICIAL REPLICAR VALUE GUIDE® FREE!

When you order either *The Complete Guide to Kit Cars* or *The Kit Car Monthly*

1982 Auto Logic Publ Inc

Here are just a few kit cars you'll read all about . . .

- ★ *Ferrari*
- ★ *Porsche*
- ★ *Pantera*
- ★ *Cobra*
- ★ *Jaguar*
- ★ *Mercedes*
- ★ *MG*
- ★ *Auburn*
- ★ *T-Bird*
- ★ *T-Bucket*
- ★ *Bugatti*
- ★ *Jeep*
- ★ *Lamborghini*

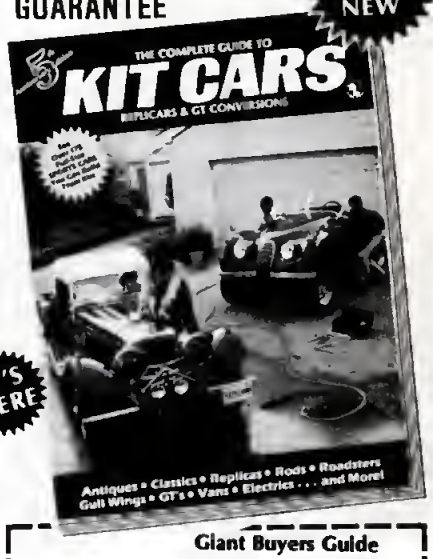
.... and much more.

You'll see . . . .

- All the Kit Cars, All the Manufacturers
- 196 Data-Packed Pages
- Over 600 Colorful Photos
- Complete Specifications, Tech Data
- Informative Articles, Product Reviews
- Assembly Advice, Do-It-Yourself Tips
- Money-Saving & Money-Making Info
- Front, Rear, Mid-Engine Powered Kits
- Antiques, Classics, Roadsters, Vans
- GTs, Gull-Wings, Electrics, ... and much more

30 DAY MONEY-BACK GUARANTEE

ALL 1982 NEW



IT'S HERE

Giant Buyers Guide
196 Pages, 600 Photos

YES! Please send me the publications checked below. I understand that both *The Complete Guide to Kit Cars* and *The Kit Car Monthly* have a 30-day money-back guarantee. Order both, everyone does!

AUTO LOGIC PUBL.
P.O. Box 2073
Department PM102
Wilmington, DE 19899

Mail Giant KIT CARS Annual
☐ $10 (3rd Class — US only)
☐ $12 (1st Class — US only)
☐ $15 (Foreign — US funds)
☐ *Kit Car Monthly* $11/year
Free Value Guide with all orders

Name _____

Address _____

City/State/Zip _____

_____

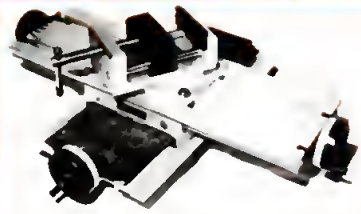
☐ Master Charge ☐ Visa Expire Date

Order TOLL-FREE Day or Night
Master Charge or Visa REQUIRED
Operator CANNOT answer questions! No CODs!
(800) 331-1000, Operator 666

★ 30 Day Money Back Guarantee ★

NOT SOLD IN STORES OR NEWSTANDS. MAILED IMMEDIATELY!

Convert Your Drill Press Into a Milling/Drilling Machine



By attaching our Mill Table to your drill press you can perform facing, slotting, milling and drilling operations on almost any machinable material. The Mill Table allows precise positive movement of any workpiece in two directions relative to the drill press spindle, just like a full size milling machine. Adding our Swivel Vise - as shown above - lets you hold small or round parts and adds angle machining to the operations you can perform.

MILL TABLE - 17" × 5.5" work surface, aluminum construction, satin anodized finish, 11" long. travel, 7" cross travel wt. 10#, $69.95 + 4.00 S&H

SWIVEL VISE - 3" wide jaws, aluminum construction, satin anodized finish, wt. 7#, $39.95 + 2.50 S&H

END MILLS - Four flute, HS steel, 1/8, 3/16 & 1/4" dia. available, any 3 for $13.95 PPD.

Your satisfaction is guaranteed. If you are not 100% pleased with your purchase, you may return it for a full refund.

Michigan residents please add 4% sales tax.

M.J. LAWRENCE, INC. Dept. 102
P.O. BOX 118A, Washington, Michigan 48094
313-798-3598 VISA & MASTERCARD ACCEPTED

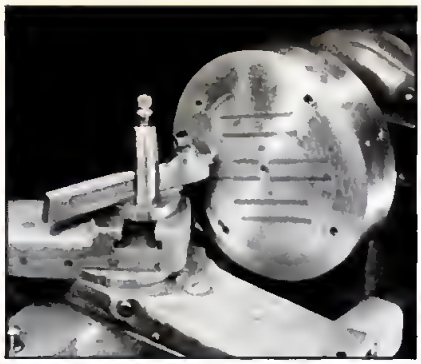
EARN EXTRA MONEY IN YOUR SPARE TIME.

In the Viking Clock Dealer Program you can work at your own pace and make thousands of extra dollars. Build grandfather clocks, mantel clocks and others for re-sale and distribute clock movements and finished clocks. Viking clocks are crafted from solid oak, solid walnut or solid cherry. Movements are West German manufactured solid brass. Compare your finished clock to clocks costing $1500 or more in stores. Yours will cost but a fraction of that. To qualify, order three movements (minimum). As a Viking dealer the prices you pay are greatly reduced. Start earning money with a nationally advertised company in a proven program. Write or call Viking Clock Company today for more information.

Create a family heirloom

VIKING
CLOCK COMPANY
DEPT. NO. PM10-162

Telephone inquiries - 205/943-5081
Box 490, Viking Bldg., Foley, Ala. 36536



A light facing cut trues and smoothes front plate so workpiece held against it by magnet can be finished to close tolerances.

Stop fingers prevent workpiece from sliding under machining loads. Magnets hold ring against the faceplate for grinding.

MAGNETIC LATHE CHUCK

(Continued from page 78)

back plate using 1/4-20×5/8-in. bolts. Use Loctite or another anaerobic thread-locking compound to make certain these bolts do not shift. With the spacers solidly in place, grind the ends using a toolpost grinder. Make each spacer equal in length so the front plate is precisely parallel with the back plate.

Mount the top plate on the spacers with 1/4-5/8-in. bolts. Do not lock them. Remove one of these bolts and drill a new hole through the front plate into the spacer. Center it between the center hole and the outer edge of the spacer. Use a No. 36 bit and thread the hole for a 6-32 bolt. Enlarge the hole in the front plate with a No. 28 bit and a countersink. Secure the front plate the spacer with a 6-32 flathead bolt. Leave the center hole in the spacer empty. It will mount the stop finger when the chuck is complete.

Repeat this procedure for the other three spacers.

Assemble the chuck frame and turn both discs to the same diameter.

Remove the front disc and slot it for the U-shaped magnet pole pieces. These came with the magnets and increase their holding force from 4 to 40 lbs. by concentrating the field of force. Lay out slots 1/10 in. wide so the edges of the pole pieces will lie flush with the surfaces of the front disk. Arrange the magnets so two cross the center of the disc with one on each side. You can mill the slots or cut them by joining a row of drilled holes with a hand file. File the ends of each slot square. The pole pieces must rest flat against the magnet when in the slots.

Magnets must be oriented so their north surfaces face one way and their south surfaces the other. It is important to maintain the correct order.

The pole pieces of the two magnets mounted end-to-end across the center of the chuck come within about 1/4 in. of each other at the corner. The gap is bridged by two pieces of mild steel fastened with instant glue. These bridges do not extend through the face plate and serve to keep magnets in position.

Strips of 1-in. aluminum angle anchor the pole pieces to the plate. Length is not critical. The one for the center magnets could have been notched to bridge the gap, eliminating separate inserts. Brass screws attach the angle pieces to the front plate, steel screws mount the pole pieces to the angles.

Friction and magnetic attraction hold the ceramic magnets in place. Once the pole pieces are in place, fill the gaps with epoxy.

Make a rim band to fit around the front and back plates to keep chips and dirt out of the magnetic chuck and to strengthen it. Three 1/8 × 3/16-in. cleats 120° apart to keep it from shifting. Overlap the ends by about 1 1/4 in. and secure them with self-tapping screws. Use chain-locking pliers to tighten the band while drilling the holes for these screws.

After assembling the chuck and tightening the rim band, mount it in your lathe. True the face with a light cut. Pole piece chips will be held and must be removed after machining.

Stop fingers were made from 1/4-in. sheet aluminum to keep workpieces from sliding under machining forces. Mount these with 1/4-in. bolts. You can make special stops for specific jobs if necessary. They serve two purposes. Besides keeping the workpiece from shifting, they can act as a jig to replace it in the same position after measuring or inspection. Swing one stop out of the way or remove it so you can push the workpiece off the magnetized surface to free it from the chuck.

Not every home machinist needs a magnetic chuck, but once you build one, chances are you'll wonder how you got by without it. **PM**

It's like having X-ray ears...

Tiny, powerful electronic "ears" let you hear whispers through walls, conversations 2 miles away.

The Dyna-Mike Transmitter

It's smaller than a quarter. But DYNA-MIKE will transmit every sound in a room to an FM radio tuned to the proper unused frequency, from ⅓ mile to 2 miles away.

If you're at a neighbor's home a block from your own, you can hear your baby's cry, or you can tell the instant your spouse comes home. If two of you are driving tandem in two cars, one or both of you can communicate with the other even if other cars drive between you.

DYNA-MIKE has as many uses as your imagination can think of. For a business conference, let the tiny microphone sit unobtrusively on the table or concealed on a shelf, and you'll be able to record every word. For businesses, you can put an FM receiver in a warehouse or remote office and "broadcast" instructions or orders to be filled.

Public speakers never had a better friend than the DYNA-MIKE. No wires or setup — just turn on one or more radios and your speech will come through with perfect fidelity. Put one on the front porch. If you hear a suspicious sound, turn on the radio and you'll hear the doorbell or the ring of the telephone.

Choose Your Model

New Horizons is introducing three models of the DYNA-MIKE supersensitive broadcast microphone. Model IC-18 is the world's smallest microphone — it's a miracle of electronic miniature power, with a high-fidelity range of 1800 feet. Introductory price is $129.95 (two for only $119.95 each).

Model X-1B is the longest-range microphone, with an unbelievable two-mile range. Introductory price is $149.95 (two for only $139.95 each).

Model X-3 is the most sensitive microphone. It broadcasts perfect-quality sound even from low-levels or whispers, up to 1,500 feet. Introductory price is $99.95 (two for only $89.95 each).

Each microphone is fully wired, complete with standard HC-1.35v. battery, good for 100 hours of continuous use and easily and inexpensively replaceable.

Of course you're protected by the New Horizon guarantee: use any DYNA-MIKE transmitter microphone for 30 days, with the right to return it for a full refund if you're not delighted.

— Phone or use this coupon —

The Super-Ear

You'll hear it all.

Effortlessly, you can hear not just a baby's cries, but quiet breathing, through a concrete wall a foot thick. Put the SUPER-EAR earphone in your ear and place the speaker on the wall. That's all there is to it.

SUPER-EAR hears everything, and even more astounding, hears it clearly. It's as though the wall weren't there. If you're coming home late at night and think intruders are in your residence, let SUPER-EAR find out for you. Want to know if the meeting is over in the room with the closed door? SUPER-EAR will tell you in a second.

SUPER-EAR is undetectable from the other side of the wall. The quality of sound has amazing fidelity—good enough to record, and SUPER-EAR has its own built-in recorder jack.

Because SUPER-EAR is the ultimate listening device, you can use it to pinpoint hidden squeaks in your car or the source of mysterious engine noises. Construction experts use it to check for flaws or cracks in buildings.

It Works Anywhere!

Ever put your ear to a railroad track to try to hear the train? Try it with SUPER-EAR. You'll hear that train many miles away. Use it as a powerful stethoscope on yourself, a friend, or a pet. You can even hear a bird's breathing.

The only source for SUPER-EAR is New Horizons. Choose from two models — Model SB-5, with ultrasensitive microphone, $139.95 (two for only $129.95 each), or Model SB-1, with suction-type microphone, $99.95 (two for only $89.95 each).

Use your SUPER-EAR for 30 days. If for any reason you're not delighted, the absolute New Horizons guarantee means you can return it for a prompt refund.

The Phone Answerer Recorder

The PHONE ANSWERER/RECORDER connects in seconds between any tape recorder and your telephone. When you're away it automatically delivers a message up to 20 seconds to anyone who calls: when you'll return, when to call back, where you are.

When you're there, the ANSWERER/RECORDER starts any cassette recorder automatically when you pick up the phone and shuts off when you hang up.

It records both sides of the conversation with astonishing clarity, giving you a permanent record of every call, preventing unauthorized use of your phone, and eliminating misunderstandings over what was said. It's specially wired to extend recording time on your tape recorder. Needs no batteries - it's always "alive".

The PHONE ANSWERER/RECORDER is a masterpiece of miniaturization. It's yours for $49.95 (two for only $44.95 each). PHONE RECORDER unit alone, records but doesn't answer, $29.95 (two for $24.95 each). Every instrument has the unbeatable New Horizons guarantee.

For immediate service on credit card orders, call toll-free 24 hours a day, seven days a week

1-800-824-7888

Ask for operator NO. 551

in California: 800-852-7777

We Absolutely Guarantee! Use any electronic instrument acquired from us for up to 30 days. If you decide for any reason that you don't want to keep it, return it for a 100% refund.

NEW HORIZONS

1 Penn Plaza, Suite 100
New York, N.Y. 10119
For Information Call (201) 370-8029

New Horizons, 1 Penn Plaza Suite 100 , New York, NY 10119 100PM2

Please ship at once, with 30-day money-back guarantee: — Phone or use this coupon —

- ☐ Super-Ear Model SB-5, $139.95
- ☐ 2 for $129.95 each
- ☐ Super-Ear Model SB-1, $99.95
- ☐ 2 for $89.95 each
- ☐ Dyna-Mike Model IC 18, $129.95
- ☐ 2 for $119.95 each
- ☐ Dyna-Mike Model X-1B, $149.95
- ☐ 2 for $139.95 each
- ☐ Dyna-Mike Model X-3, $99.95
- ☐ 2 for $89.95 each
- ☐ Phone Answerer/Recorder, $49.95
- ☐ Phone Recorder, $29.95
- ☐ 2 for $24.95 each

Indicate payment method

____ Check enclosed

____ Bill to ____VISA ____ Master Card

No. _____

Expires _____ Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please add $1.75 per total order for shipping.

BEST BUY!

EASY-TO-ASSEMBLE KIT

ONLY $425 F.O.B. Broomall

For 3'6" diam. Other diams. from 4' to 7' at comparable savings. All diams. adjust to floor-to-floor hts. of 8'1½" to 9'6".

Now! Showroom & Warehouse locations in:

Pomona, CA (714) 598-5766
Sarasota, FL (813) 923-1479
Houston, TX (713) 789-0648

© The Iron Shop 1977, 82

People who've looked everywhere tell us there isn't another spiral stair around that touches our combination of price and quality of materials and workmanship. We believe it!

CALL OR WRITE FOR FREE BROCHURE:

To The Iron Shop Dept 118S Box 128 400 Reed Road Broomall, Pa 19008 Our Tel (215) 544-7100

Name _____

Street _____

City _____ State _____ Zip _____

We accept MasterCard and VISA

THE IRON SHOP®
MANUFACTURERS

Soundproof Your Bedroom Electronically

The Sleepatron in effect soundproofs your bedroom electronically at very low cost and induces sleep in a very safe and natural way. The Sleepatron works by making a sound like heavy rain that drowns out extraneous noises that keep you awake or awaken you and gives you a secure feeling. It also induces sleep because the primal instinct of man is to want to sleep when the sound of rain is heard. Some of our customers who had been taking sleeping pills for years have reported being able to give up taking them after receiving their Sleepatron. Many people who have to sleep in a noisy environment have found it to be a godsend. It is also a great help for those who must study or concentrate in a noisy environment. It is a great companion to the traveler, being small and completely portable. $75.00 or send for free literature.

GARDINER ELECTRONICS 602 - 274-9681
Dept. 86 4729 N. 7th Ave., Phoenix, AZ 85013

One Man Portable Sawmill

NEW

Cuts 30% more lumber from up to 30" Dia. x 16½' logs. Safe bandsaw carriage for smoother more accurate lumber. Ready to operate.

Wood Carving Duplicator

Accurate, simple, 1 to 1 wood duplicator 3 models available, easy to operate.

Bandsaw

Large 24.5" throat, 9" vertical cut tilt table, wood and metal cutting, rugged construction, affordable.

Save — Buy Direct

Dupli-Carver (317) 243-7565
4004 West 10th St. Dept. 2001
Indianapolis, IN 46222

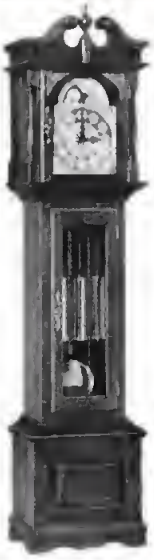
☐ Enclosed is $1.00 for 32 page catalog and information on 30-Day Free Trial

Name _____

Address _____

City _____ State _____ Zip _____

FREE
COLOR CATALOG



Build Your Own Grandfather Clock
Prices Starting Under
$255
(including movement and dial)

- Do-it-yourself case kit, parts pre-cut
- Finished clocks
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Factory direct prices
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment

MASTERCARD and VISA ACCEPTED

EMPEROR® CLOCK COMPANY
WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS
Dept. 527, Emperor Industrial Park
Fairhope, Alabama 36532

IN CANADA: Emperor Clock Company, Inc., Dept. 527
506 Newbold Street, London, Ontario N6E 1K8

SMART IDEAS

If you're looking for ideas to save time and money — while enjoying what you're doing — send away for PM's catalog immediately.

We have plans for shop tools, boats, storage houses, campers. Scuba tow, ACV, log splitter, air compressor. Smart ideas in furniture! Also dollhouses! Projects the whole family can enjoy.

And best of all — we offer a special and unique service — photocopies of past PM articles. What's more, we tell you the year the projects were published. It may be as early as a 1902 glider to a most recent 1981 solar garden shed. You'll have fun just browsing through the approximately 900 different plans and projects. You'll find our GREAT WORKSHOP series listed. Also our SHOP MINI-COURSES. Timely energy-saving ideas! You'll see it all in our new POPULAR MECHANICS PLANS AND IDEAS CATALOG.
Price $1.00

NEW EDITION
order today!

Send Your Name and Address with Check or Money Order to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101

Popular Mechanics is a publication of Hearst Magazines, a Division of THE HEARST CORPORATION

NEXT MONTH IN PM

- ***Driving skills that can save your life.***
- ***PM Flies the Space Shuttle.***
- ***Cabinetmaker's workbench—plus craftsman's tool center to build.***
- ***Famous gun replicas.***

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery to the Postal Service within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350.

Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or when renewing your subscription.

Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

Popular Mechanics

P.O. Box 10060, Des Moines, Iowa 50350

YES! Please enter my subscription to POPULAR MECHANICS for: WFPM

☐ 1 year $11.97
☐ 2 years $21.97

Payment of $_____ is enclosed.

Bill Me _____
Initial here

Name (please print)

Address

City State Zip

Your first copy will be on its way to you in six to twelve weeks. Watch for it!

A publication of the Hearst Corporation.

Charge orders subject to publisher's acceptance.
(Above prices apply in U.S. & Possessions only. Canadian and foreign prices upon request.)

CHANGING ADDRESS?

If you're planning to move, please let us know at least eight weeks before changing your address. Attach current address label and fill in your name and your new address. This will serve to insure prompt service on your subscription.

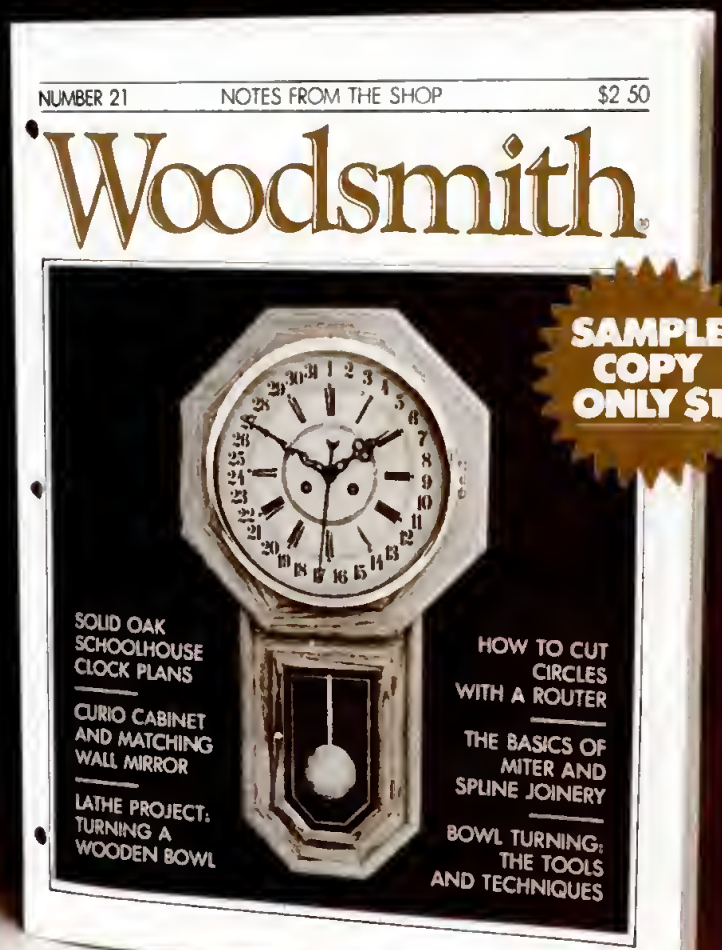
Send old label with your name and new address to:
POPULAR MECHANICS
P.O. Box 10064, Des Moines, Iowa 50350
or call toll-free: 800-247-5470
State of Iowa residents call: 800-532-1272

NAME_____
(Please print)

NEW ADDRESS_____

CITY STATE ZIP CODE

TIMELY OFFER



Spinning Server with How-to Drawings

Curio Cabinet

Turned Fruit Bowl

Thousands of woodworkers turn to *Woodsmith* for the step-by-step plans and straight-from-the-shop techniques they've been looking for. Now, you can look into this sample copy to see what you've been missing.

Schoolhouse Clock. It's easy to build this solid-oak clock with the complete plans in this issue. All plans in *Woodsmith* include exploded views of the joinery, details of the problem areas, and down-to-earth directions.

Spinning Server. Discover how to cut perfect circles with the step-by-step illustrations for this Lazy Susan.

Curio Cabinet. Miter and spline joinery is used to build the glass-paneled frames for this Curio cabinet. We've included a special article on a very accurate way to make this joint.

Bowl Turning. Five pages of step-by-step directions show you all the basics for turning this beautiful Fruit Bowl.

SPECIAL OFFER. Now you can get all of these woodworking plans and techniques (and much more) with this offer for a sample copy of *Woodsmith*.

• To get your sample copy, send only $1 to *Woodsmith*, Dept. 26, Box 842, Des Moines, Iowa 50304.

Name _____

Address City State ZIP

FIRSTHAND REPORT

Driving The Porsche 944

The 924 replacement is a car even the Porsche purist can love.

by Joe Oldham

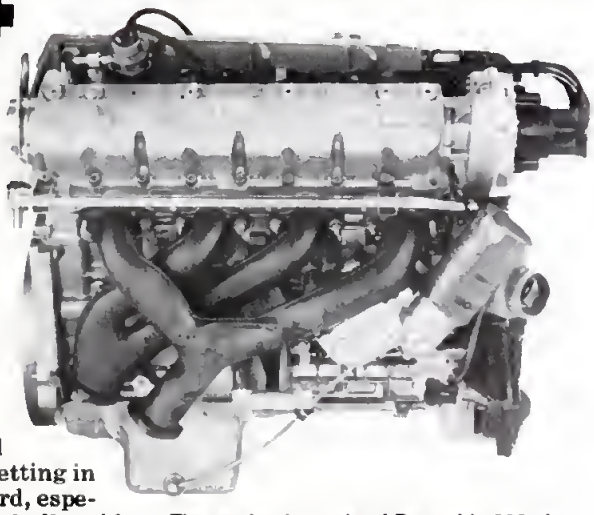
Okay, all you Porsche purists, you can stop picking on the 924 now. You can stop your carping about Porsche building a car that "really wasn't a Porsche." Yes, the 924 borrowed too many components from the Audi parts bins, most notably its engine. But all that's in the past. The two-liter 924 and 924 Turbo are no more. Their replacement, the 944, is a thoroughbred Porsche, fairly bristling with high-tech hardware, a "real" Porsche, one that even purists can love—providing, of course, they're not so pure as to want the engine in the rear.

One drive in the 1983 944 (yes, it's a 1983 model) will convince anyone of its breeding. Its performance levels are high enough for it to be able to hold its own even among the bluebloods of cars. In fact, the 944's performance levels are so high that most people who buy one of these cars will never experience its outer limits. They won't be good enough drivers.

The 944 sits low, real low. And that makes getting in and out a little awkward, especially if you're on the bulky side. Once in, though, it's easy to find a comfortable driving position. The form-fitting buckets mold you all the way from your lower thighs right up to the upper part of your back. The seat shape, combined with the tweed cloth covering, makes it virtually impossible to shift around while you're driving. Instead, you feel like you're sitting on a Velcro fastener. Whether this is good or bad is up to you. Personally, I like a little looser fit. On long drives, it's restful to be able to shift your weight slightly from time to time.

The 944's engine is so quiet that I didn't realize it was running the first time I started it up. Once underway, however, I never made that mistake again. I was always quite sure it was running. Here's a 2.5-liter, four-cylinder engine that will melt the tires in first gear, get rubber going into second, accelerate the car from zero to 60 mph in 8.1 seconds, compress your spine into the seat while doing it, top out at about 130 mph and deliver over 20 mpg—all with the air conditioning on and never breaking a sweat.

The engine capable of all this is made entirely of Reynolds 390 aluminum alloy. Two internal balance shafts counterbalance vibrations, and an overhead camshaft makes this engine as smooth as any Six or V8 you've ever owned. Porsche's Weissach engineers have included a computerized digital electronic engine control system which precisely controls the no-maintenance fuel-injection and ignition systems. And the engine rides in hydraulic engine mounts to further smooth out vibrations. The result of all this is a rating of 143 hp at 5,500 rpm and 137 ft. lb. of torque at 3,000 rpm. It feels like twice as much behind the wheel.

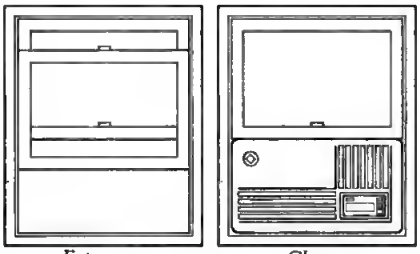


The engine is made of Reynolds 390 aluminum alloy. No cylinder liners are used. Weight is low, yet power output is high. Engine delivers 143 hp at 5,500 rpm.

The engine acts like it wants to rev forever. Only the built-in rev limiter that cuts the ignition when you go over the redline was enough to save the engine on several occa-

(Please turn to page 86)

Introducing A Cheaper Way To Get Fresh Air Than Opening A Window.



Expensive *Cheap*

Mother Nature may provide fresh air through the window free, but the gas and electric companies aren't quite so generous about heating and cooling that fresh air.

Of course, if your home isn't insulated and leaks like a sieve, you don't have the fresh air problem.

But if you're insulated, you do somehow need fresh air.

THE MORE INSULATION YOU HAVE, THE MORE FRESH AIR YOU NEED.

The fact is, you can insulate and weatherstrip and storm window yourself to the point of mixed blessing. Because the insulation that keeps in things you want like heat and cool also keeps in things you don't want like formaldehyde gas, carbon monoxide, nitrogen dioxide, benzopyrene, and radioactive radon.

Our inexpensive alternative to the expensive open window is the Lossnay Heat Exchanger.

What it is is a pair of fans to bring in fresh air and exhaust stale air. Fans that use less electricity than the average light bulb.

And in-between those fans is a bunch of specially treated paper, arranged in a way that a temperature exchange takes place. And this takes no electricity at all.

STALE AIR HEATS FRESH AIR.

Fresh, cool winter air from the outside is heated by the stale warm air from inside the home as they pass each other in separate adjacent compartments.

Most of the heat is thereby saved instead of escaping through the window. Which reduces the load on your heating system.

Which saves you money. In both utility bills and the capacity of the heating and air conditioning units you need to put in your home.

STALE AIR COOLS FRESH AIR.

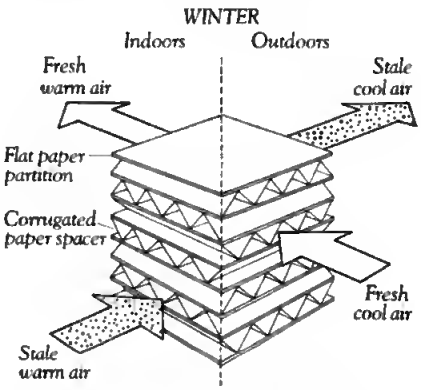
In the summer, exactly the same thing happens in reverse.

Fresh, warm outside air, as it passes through the Lossnay, picks up coolness from the stale, cool air being exhausted. Thus reducing the work your air conditioning system has to do.

And summer and winter, humidity is also exchanged in Lossnay's paper exchange elements. Which keeps room humidity in comfortable balance (reducing it in the summer, increasing it in the winter). All other makes of static heat exchangers use metal exchange elements, which do not transmit humidity; they can leave rooms excessively dry in the winter by removing virtually all of the moisture in the air without replacing any of it.

For the Lossnay representative near you, call (800) 421-1132 toll-free. In California call (213) 537-7132.

Or write Mike Thomas, Mitsubishi Electric Sales America, Inc., 3030 Victoria Street, Compton, California 90221.



You'll save money without having to breathe bad air.

So you don't have to pay through the nose for energy conservation.

MITSUBISHI ELECTRIC LOSSNAY

Finish drywall with NO DUST!

tape joints
nail heads
patch areas

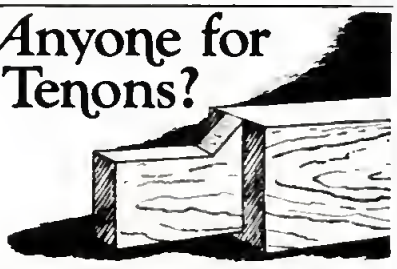
- Use the new Drywall Wet Sander
- Newly invented Nylfoam® sponge
- No dust because it's used wet
- Replaces sandpaper
- For finishing wallboard, tape joints, nail heads and patch areas
- Neat, clean, fast
- Your money back if not satisfied
- Only $3.00 each, postage paid

To: PADCO, INC.
Box 727
Mendota, MN 55150-0727

Enclosed is $ _____ for _____
"Drywall Wet Sanders"

Please mail to:
Name _____
Address _____
City _____
State _____
Zip _____

Anyone for Tenons?



If your racket is tenons, doubles or singles, and you want a perfect match every time, you can learn from the professionals. They know a classic way to join two pieces of wood together is with a tenon that fits into a mortise.

Fine Woodworking magazine speaks this language to more than 200,000 readers—people seriously interested in making beautiful things out of wood. Whether you are an aspiring novice or an accomplished expert, you'll find it an especially informative magazine, with finely detailed articles about techniques and tools, materials and design. It's written by master craftsmen who share their many years of woodworking experience. And it's printed on heavy paper to withstand years of reference. All back issues are in print and indexed periodically.

If you want to become a better woodworker, send $14.00 for a one-year subscription (6 issues). Or call us toll-free, 1-800-243-7252, to charge your order (Ct. residents call 1-426-8171). If you're not pleased, we'll be happy to refund.

Fine WoodWorking

The Taunton Press
52 Church Hill Rd.
P.O. Box 355MV
Newtown
Connecticut 06470

DRIVING THE PORSCHE 944

(Continued from page 84)

sions when I got overenthusiastic.

Backing up the engine is as sweet a five-speed transmission as you'll find. It's butter-smooth with short, precise throws that allow you to snick from gear to gear like a Formula One racer. The transmission is mounted in back at the rear axle for better weight distribution—it's exactly 50-50 front to rear—and, therefore, better handling. The front-mounted engine and the rear transaxle are linked by a rigid driveshaft tube. Rack and pinion steering, fully independent suspension, the four-wheel vented disc brakes and 215/60VR15 tires on 7×15 wheels represent the latest refinement in Porsche's chassis development program which was begun in 1976 with the 928. While most of this hardware is carryover from the 924, it's all been recalibrated to handle the additional power of the new engine.

All the tech goodies translate into real world handling and stability of the highest order. This is a car that literally begs to be pushed hard. You'll reach your limits before the car will reach its. Jam it hard into a tight turn. Downshift, brake, power out. It almost doesn't matter what you do with the 944. The car just seems to motor on through, nonplussed, almost aloof from the hamfisted operator in the driver's seat. The car will make you look good, yes, even save you if you cross over the line.

I spent about three weeks with our test 944, which also had the optional stabilizer bars and 205/55VR16 tires on 7×16 wheels. These tires are even fatter and stickier than the stockers, and the sway bars virtually eliminate body roll except in the fastest corners.

In all, you get a tremendous feeling of confidence when driving the 944. I doubt whether there are a handful of cars in the world that can match 944's combination of acceleration, braking, handling and excellent road manners.

That's not all. The 944 also has the audacity to be fuel efficient too. EPA estimates are 23 mpg city, 36 mpg highway, for a 27 mpg combined rating. I drove the test car hard, not giving a damn about gas mileage, and still managed to rack up several 21-mpg tankfuls.

The extraordinary combination of performance and fuel economy can be partly attributed to the 944's slippery, wedge-shaped body, the result of extensive wind tunnel work. The drag coefficient is just 0.35. While few other sports cars even begin to approach this figure, the 944's air drag rating is even more significant when its frontal area is taken into consideration. The fact is, the 944 is a very wide car, which would normally *increase* drag. It doesn't happen here, thanks to great attention to aerodynamic detail.

The flexible polyurethane nose incorporates a functional air dam which diverts air around the flared fenders of the car while permitting a low-drag, under-bumper intake for the radiator. Flush-mounted fog lights are located in the air dam. Other attention to aerodynamic detail includes flush windshield moldings and spoiler.

You don't feel deprived of luxury while enjoying all the 944's sport. Standard is a long list of equipment including air conditioning.

All this for $18,500. Too much? It's actually a bargain when you compare what else you can buy for that amount of money. And nothing in its price range can touch it once you hit the road. PM

No matter how we abused the 944, it just kept coming back for more. Handling and stability remain excellent through any kind of corner, weather, or road condition.

Cache recently located...

ORIGINAL U.S. GOV'T. MORGAN SILVER DOLLARS

in U.S. treasury bags

THE CONSUMER'S COIN RESERVE announces: For one week only 9,861 original fine condition Morgan Silver Dollars will be released to the American public @ $19.40 each...$9.60 less than a major competitor.

MORGAN CACHE LOCATED 9,861 original Morgan Silver dollars have been found in U.S. Gov't treasury bags and will be sold to the public through this notice. The federal government ordered the meltdown of Morgan Silvers over a half century ago, making these coins one of the rarest in the world. Their silver content, then as today is .90 fine silver. Morgan Silver Dollars have had an average annual appreciation of 26.5% in value.

MARKET CONDITIONS The combination of the favorable silver market and locating these Morgan Silver Dollars has made this offer possible. Each coin is guaranteed to be Fine Quality or better with a certificate to that effect. We will only hold this price for one week due to the fluctuations in the precious metals market.

TAKE NOTE Our price of these Fine Quality Morgans is $19.40 each. This price is $9.60 less than a nationally advertised coin dealer, therefore we advise you to get your order in early before the strict limit of 9,861 is sold. We offer a 14 day examination period for each coin, coins returned within that time will receive a full refund. A limit of twenty coins per customer will be strictly adhered to.

For VISA & Mastercard Holders
CALL TOLL FREE
800-824-7888
Ask for Operator #709
24 Hours a day—7 days a week—including Sunday
In California 800-852-7777 In Alaska & Hawaii—800-824-7919

© 1982 Consumer's Coin Reserve
235 W. Haviland Lane, Stamford, CT 06903

Consumer's Coin Reserve, Dept GMM237
P.O. Box 1046, Scarsdale, N.Y. 10583

Please send me by certified mail _____ Morgan Silver Dollars at $19.40 each, plus postage, handling, and insurance as indicated below. I have 14 days to inspect my coins, at which time I will receive a full refund if I return them to you by certified mail.

- ☐ (#906A) 1 Morgan Silver Dollar only $19.40 plus $3 postage, handling, and insurance
- ☐ (#906E) 5 Morgan Silver Dollars only $97 plus $5 postage, handling, and insurance
- ☐ (#906J) 10 Morgan Silver Dollars only $194 plus $10 postage, handling, and insurance
- ☐ (#906T) 20 Morgan Silver Dollars only $388 plus $15 postage, handling, and insurance

N.Y. & Ct. residents add sales tax

Total amount enclosed $_____

Charge your order ☐ VISA ☐ Mastercard

Acc't #_____

Exp. date_____ M.C. intbk#_____

Signature_____

Telephone number_____

Mr. Mrs.
Ms. Miss_____

Address_____

City_____

State_____ Zip_____

LYNCHBURG
HARDWARE & GENERAL STORE®
42 Main St., Lynchburg, TN 37352

JACK DANIEL'S
FIELD TESTER SHIRTS

These are just like the shirts old Wallace Beery used to wear. Of course, my shirts have the added feature of a "Jack Daniel's Old No. 7 Field Tester" on the chest. Made of 50% cotton-50% polyester they wash easy and keep their shape. Colors: Natural with brown lettering, red or black with white lettering. Sizes: XS, S, M, L, XL. **$15.00** delivered.

Send check, money order or use American Express, Visa or MasterCard, including all numbers and signature. (Add 6¼% sales tax for TN delivery.) For a free catalog, write to Eddie Swing at the above address. Telephone 615-759-7184.

AVOID SERIOUS ACCIDENTS!

A BACK-UP-BEEPER:
- ALERTS CHILDREN, PETS, SHOPPERS
- EASY INSTALLATION
- AUDIBLE IN CAR AREA ONLY

For credit orders only call toll free (except N.C.)
800-334-0854
ext. 867
In N.C. 919-493-2009
American Express, Visa, Mastercard or send check or money order for $12.95 plus $1.50 postage and handling to:
J&H Instruments, Inc.
P.O. Box 31527 • Norwood Rd.
Raleigh, NC 27622
N.C. residents add 4%. Allow 4-6 weeks

The Ultralight You Can Take Anywhere

Remove the wing, add pontoons, and the Jet Wing becomes an exciting 40-mph airboat.

Most ultralight aircraft are content just to fly, but this latest model can turn itself into almost any kind of transportation.

Called the Jet Wing ATV (for all-terrain vehicle), it's basically a three-wheeled undercarriage, with 30-hp engine and prop, to which interchangeable accessories are attached. Mount a wing on it and it's a sport plane you can fly without a pilot's license under current FAA regulations. It cruises at 37 mph and can climb at 1,000 feet per minute—hot for an ultralight.

But this is just the beginning. Exchange the wheels for pontoons and the craft converts to a seaplane for use on water. With the wing removed, it becomes a speedy airboat, capable of more than 40 mph. Switch back to wheels and the wingless trike is now a prop-driven ATV that requires no traction on soft or slippery ground. And you can use the wing alone, without the trike, as a pure hang glider.

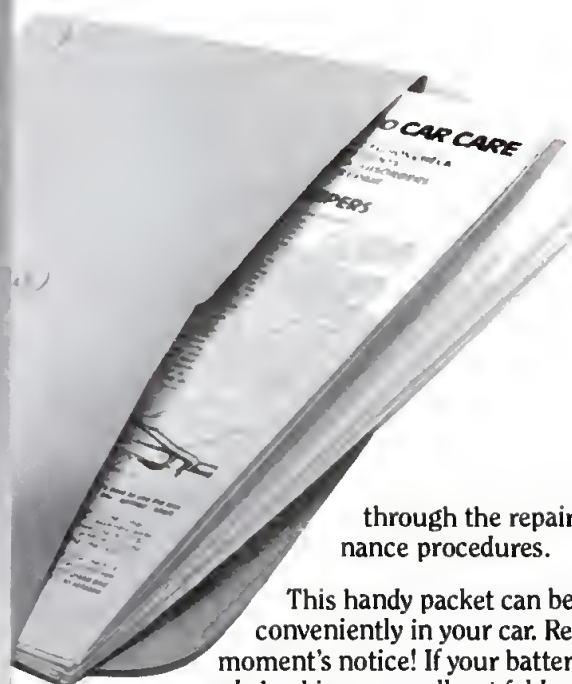
The basic landplane kit, with a 33-foot wing and wheels, is $4,695 from Flight Designs, Box 1503, Salinas, Calif. 93902. A float kit for seaplane conversion is $1,475; additional airboat fittings are $460. Brakes are $225, and a hang-glider harness is $105. What's next? Possibly skis for snowmobiling and balloon tires for beach roaming.

—*Shel Gallager*

Aloft, craft hits 37 mph, has hot climb.

On land, wingless trike is a zippy ATV.

Master Keys to Car Care



through the repair and maintenance procedures.

This handy packet can be kept very conveniently in your car. Referred to at a moment's notice! If your battery and cable need checking you pull out folder number 11 and find the answer. To repair a car dent, folder number 1 will show you how. Why isn't the air conditioner keeping your car cool? Number 12 has the answer. IT'S THAT SIMPLE!

This information packet will help keep your car in top running order and will show you how to repair your car if something does go wrong, especially on an isolated road or highway. Just think how convenient it will be and the money you can save.

If you drive a car, you need these Master Keys!

POPULAR MECHANICS MASTER KEYS TO CAR CARE packet can help you out! In this handy packet you can find your basic car repair needs in step-by-step instructions, all shown on numbered sheets, supplemented by photos and diagrams that show what you'll see under the hood of your car as you go

PM's Master Keys to Car Care is available for $4.95

Send check or money order to: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101.

For faster mail service add an extra $1.00

Popular Mechanics is a Publication of Hearst Magazines, a Division of The Hearst Corporation.

©1982 R. J. REYNOLDS TOBACCO CO.

Now and them.

Competitive brand tar levels reflect the lower of either FTC method or Dec '81 FTC Report.

SOFT PACK 100's FILTER, MENTHOL: 2 mg. "tar", 0.2 mg. nicotine av. per cigarette by FTC method.

CONFIRMED BY LATEST U.S. GOV'T. REPORT ON TAR

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

NOW The Lowest

The lowest in tar of all brands.

Turbocharged Mooney 231 flew coast to coast in 8 hours, averaged 24 mpg at over 300 mph.

Singles, Anyone?

PM Technology Editor Robin Nelson (right seat) checks out a Mooney crammed with latest instruments.

PM photos Peter Tenzer

If anything beautiful came out of the gas squeeze, it is today's luxury, single-engine planes.

by Robin Nelson
TECHNOLOGY EDITOR

Not long ago, the proud owner of a new, single-engine airplane offered a ride to an acquaintance who happened to be an airline captain. "Hmmm," the DC-9 jockey mused as he squeezed into the smallish right-hand seat, "got dual glideslopes, huh?" (He was referring to the primary and backup displays for Instrument Landing System approaches.) "I could go for that. Hey, you have color radar, too. Mine's monochrome—and what's that?"

The object of his query was an optional accessory called the Ryan Stormscope, which displays the relative positions of up to 250 lightning strikes on a radarlike screen. Clusters on the Stormscope are a far more positive indication of severe turbulence than big-plane weather radar can give.

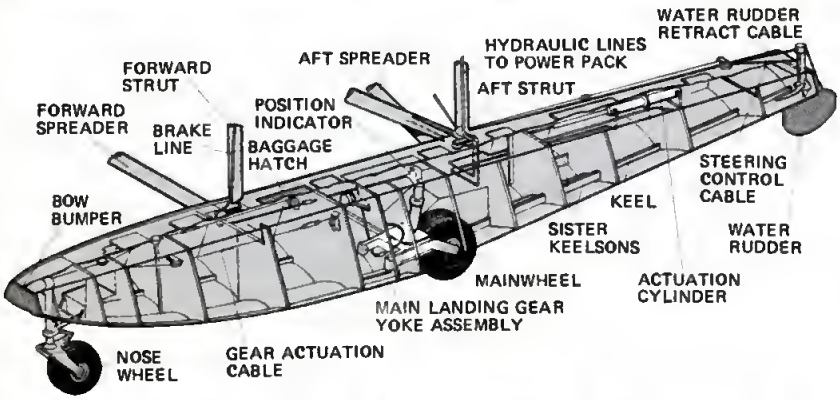
Duly briefed, the captain could only marvel at an instrument panel the likes of which would provide similar novelty for flight crews of the majority of scheduled airliners plying U.S. domestic routes.

What's more, with an optional oxygen system or pressurized cabin, and turbocharged engine, there are single-engine planes that will go right up there with the jetliners at altitudes of over 20,000 feet. And the tape deck gives you *true* stereo, folks, not that through-the-tube stuff.

What this means for private or

Cream of the turbocharged '82 singles includes (from left) Beech Bonanza B35TC, Mooney 231, Cessna Pressurized Centurion II and Piper Saratoga SP. The 210-hp Mooney is low end at $77,600 list; Cessna (310 hp) tops $182,000. Deluxe avionics, radar, autopilot will add as much as $40,000 to each.

Watertight compartments, over 8,000 rivets, give integrity for tough water operations.



AMPHIBIAN FLOATS: FREEDOM AT A PRICE

Crossing Long Island Sound at 140 mph, 100 feet up in Edo Company's Cessna 206 with its 3,500-pound-displacement floats, the feeling is one of total freedom. There are no other planes to look out for at this altitude (legal over water). If *our* engine quits, we just turn back into the wind and land.

The floats and landing gear must be built to rigid FAA specs. All parts are assembled like an aluminum yacht (see above) and add up to $50,000 to the price of an airplane (assuming it has been built or retrofit with a float-stressed airframe). There's a weight penalty, too—about 500 pounds over normal retractable landing gear.

But the flexibility to land on all tidal and most states' inland waters, plus scrounge for fuel at any Podunk airport makes for a luxury many owners can justify.—*R.N.*

quasi-business owners of these aircraft is that they were born at the right time. The one-mill flying machine available to the man in the street has never been safer, more versatile or more fun. And it may never get any better.

The super singles evolved partly as a result of the mid-'70s fuel crunch. Even afterward, there are some places in this country where aviation gasoline has never dropped much below $2 per gallon. A high-performance, single-engine plane can get up to 19 mpg at economy cruise power (about 65 percent of maximum available). The best of the twin-engine planes barely scratch 10. The super single, then, is really a prefuel-crunch light twin squeezed into a smaller profile for economy's sake.

And with a larger, turbocharged engine, twin performance has not been compromised. For example, in 1980, a Beechcraft Bonanza A36TC flew 4,300 miles nonstop from New York City to Munich, West Germany, in less than 16½ hours. And last year, a Mooney 231 flew from San Francisco to Washington, D.C., in 8 hours. (Both had extra fuel tanks installed, but were stock, turbocharged aircraft in other respects.) The Mooney, in fact, averaged 24 mpg on that run; *your car* might do a little better, but not at the 302-mph ground speed the little bird averaged.

Speeds in that range, obviously, are wind-aided. But turbocharging gives the single-engine pilot the service ceiling to go up and find *his* wind. And it eliminates the density-altitude problems of yore, when there was no way certain aircraft could take off from some high-altitude runways on hot days.

Naturally, in the minds of people who sell airplanes, it makes no sense

(Please turn to page 198)

Small single engine panel still has room for radar (center), dual Instrument Landing System glideslopes (left side), autopilot (center) plus multiple radios and stereo tape deck (stacked at right).

Earmarks of the hot singles include the following: **1** Radar antenna—shown here built into Mooney's wing. **2** Air scoop for turbocharger—Piper Saratoga's makes a landing light housing as well. **3** Pressurized cabin is unique to Turbo Centurion II; others are planned. **4** State-of-the-art electronic instruments—Collins CRT navigational instrument is still in development; push-button changes overall compass display to an arc segment, incorporating supplemental nav data.

Interiors have grown up along with engines and instruments. Piper Saratoga's fore-and-aft rear seats (right) add a touch of luxury to the necessarily narrow cabin.

Best Stereos For Penthouse Or Playroom

'Panthouse' system (left): Sony STR-VX6 receiver is an advanced design that pumps out 70 watts of pure sound per channel. The TD-105 Mk II Thorens turntable stars true Swiss-precision mechanics. The TA-2070 cassette deck from Onkyo is a superb unit, featuring three-head design. Ohm Walsh 2 speakers have unique and sophisticated design. The middle-class system (right), pictured here in a playroom, is no sonic slouch. The Sansui R-606 receiver produces 30 watts per channel of clear power; Dual C-814 cassette deck features several splendid options and Acoustic Research's AR-38 speakers have full range of sound. Yamaha P-751 turntable rounds out system. The wall unit is courtesy of JCPenney.

PM photos Harry Hartman

Regardless of your budget, you can get a stereo that sounds more expensive than it was. Here are three systems that fit the bill.

by Hans Fantel

For most stereo fans, one specification outweighs all others: price. The kind of system you're likely to buy depends on how much money you have to spend. With the price of stereo ranging from a few hundred dollars to the five-figure stratosphere, you have to peg your budget somewhere between extremes.

A single, super-deluxe component may cost as much as an entire budget system. If this seems odd, consider that you can buy several Rabbits for the price of one Rolls, yet either car will get you there. Similar price/value relations hold true in the audio world.

The trusty old saying that you get what you pay for doesn't always hold true. Especially in stereo, some models give you more for your money than others. Expensive equipment naturally outperforms low-cost components. But within each price range, it's possible to pinpoint the exceptional. That's what we did here.

We set up three price classes: 1. "Dormito-

Our dormitory system is still at the top of its class. Onkyo's TX-11 receiver supplies 20 watts per channel; the cassette deck is Technics' RS-M205; the belt-driven turntable, which is also from Technics, is the SL-B202 and the speakers are the Boston Acoustics A40s. Total cost of system: approximately $700.

ry," 2. "Playroom," and 3. "Penthouse." Then, we tried to pinpoint the exceptional components in each price group.

Our main concern was with musical merit rather than technical frills. We compared specs, but those weren't our primary consideration. In fact, we used the specs mostly to confirm what our ears told us. On the whole, our judgment was based on listening.

Our listening test covered four different kinds of music:

- Symphonic music, to check the system's ability to render heavy scoring and remain clear, even at an orchestral climax.
- Jazz, to test crispness of percussive transients and the ability to keep the brass shining with brilliance, without getting harsh at loudness peaks.
- Rock, to test for adequate bass thrust.
- Classical vocal and chamber music, to check truthfulness of tone color in voices and string instruments.

Here, then, is how the three systems stack up on those terms.

'Dormitory'

With 20 watts per channel, the Onkyo TX-11 receiver won't shake the rafters, but it puts out sweet, clear sound at normal volume levels—enough to get a fine sense of musical realism in a medium-sized room. Distortion (0.08 percent total harmonic distortion (THD) at

(Please turn to page 204)

PM'S PICKS OF THE STEREO SYSTEMS

	Penthouse	Playroom	Dormitory
Turntable	Thorens TD 105 Mk II ($335)	Yamaha P-751 ($270)	Technics SL-B202 ($135)
Cartridge	Shure V-15 Type V ($200)	Shure M-75HE ($92)	Audio Technica AT-11 ($50)
Receiver	Sony STR-VX6 ($670)	Sansui R-606 ($300)	Onkyo TX-11 ($200)
Speakers	Ohm Walsh 2 ($700 par pair)	Acoustic Research AR-38 ($300 per pair)	Boston Acoustics A40 ($150 per pair)
Cassette deck	Onkyo TA-2070 ($420)	Dual C-814 ($300)	Technics RS-M205 ($165)
Total cost	$2,325	$1,262	$700

New Cameras That Make Photography Easy

Cameras that autofocus, others that take 3-D pictures or some that use no conventional film at all make picture taking more fun than ever.

by Neil Shapiro ELECTRONICS EDITOR

For shutterbugs or camera buffs, there are new systems that put the thrill back into taking pictures. It's easier than ever to click the shutter for a fine photo to show off later. We checked out six cameras, using these new systems, and were impressed by the fine results and startling designs.

The Polaroid sonar-imaging system for automatic focusing is an integral part of the SX-70 and new Sun Camera we used. Kodak's new disc system makes the Disc 8000 camera a treat. A new method of electronic autofocus turns the Canon AL-1 into a 35-mm friend. The three-dimensional effect of the Nimslo is astonishing. And Sony's plans for the Mavica system of no-film photography sound grand.

Times have never been

Polaroid Sun 660

Polaroid SX-70

Canon AL-1

Nimslo 3D

Sony Mavica

Kodak Disc 8000

Handsome-looking cameras above help you take great shots. The Polaroids (Sun 660 and SX-70) have a sonar-ranging autofocus system. Canon AL-1 uses new, integrated-circuit technology for its autofocus. The Nimslo 3D takes three-dimensional photos on specially processed film. Kodak's disc system potentially puts easy-to-use cameras in everyone's grasp. In the meantime, Sony is trying to turn photography around with the Mavica all-electronic, filmless camera.

PM photos: Peter Tenzer

better. Looking at the Polaroid SX-70 or the new Sun Camera, one feature that stands out is the round, golden-grilled object just above or next to the lens. This device, called a transducer, is the heart of Polaroid's sonar-based, autofocus system.

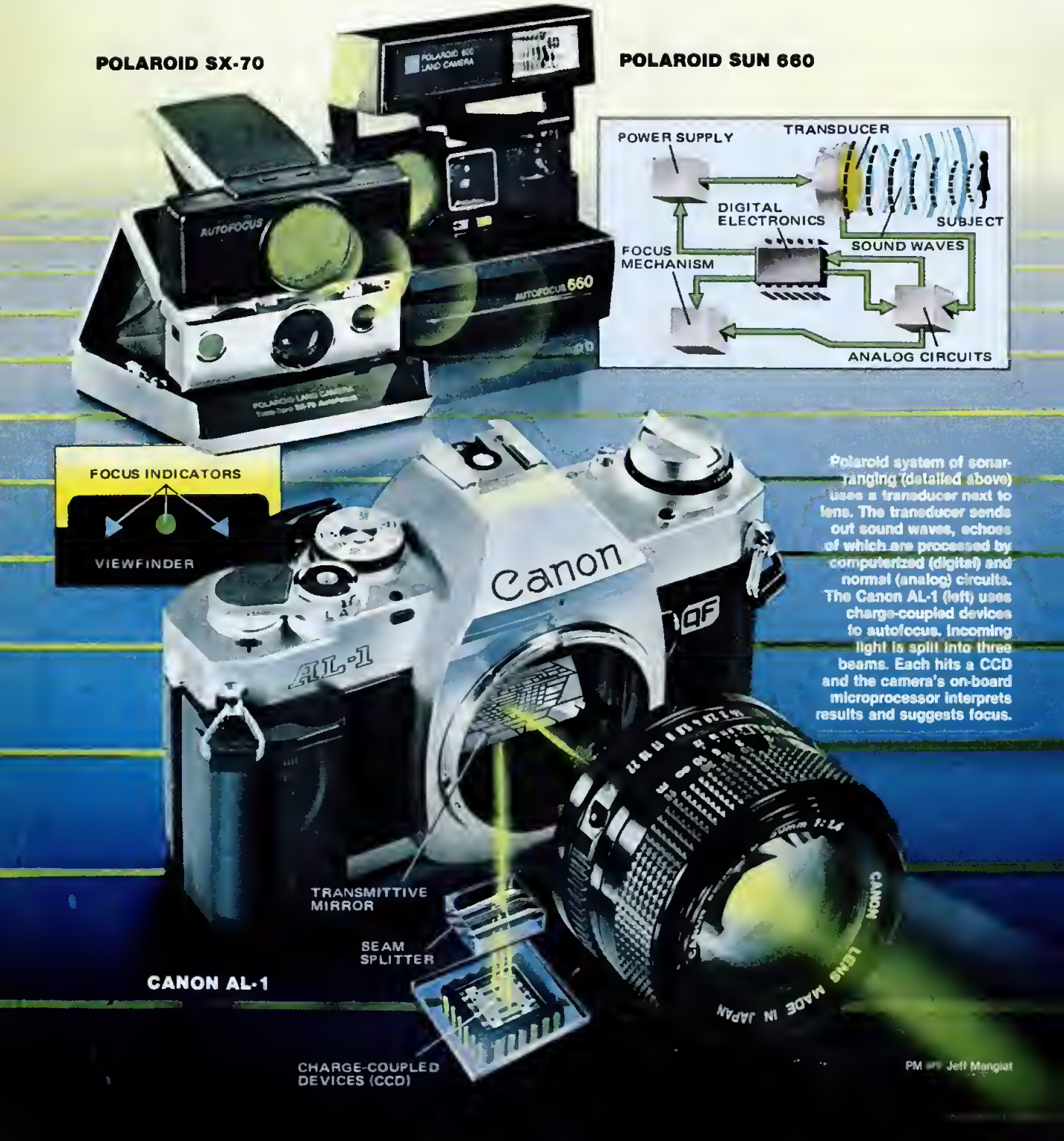
The transducer can be considered a very accurate, four-toned speaker. Inside it, very thin, plastic film vibrates as voltage is applied and sends out tones of 60, 57, 53 and 50 kHz.

The sound waves bounce back to the transducer from objects they strike between about an inch and 35 feet away. The detected echoes are processed digitally, then the lens of the camera is adjusted to focus through analog circuitry.

In use, the system was fail-safe. The SX-70 camera requires you to first depress the shutter partway in order to focus. The Sun Camera allows for focusing and shooting in one movement, though it sacrifices the SX-70's close-up abilities.

Every shot we took was in focus. Of course, there are certain shooting conditions to avoid. Obviously, you cannot focus automatically from behind a window, since the camera will focus on the window pane. Likewise, complex surfaces, such as leafy plants, could fool it.

But for everyday shooting, it couples the surety of autofocus with the quick gratification of develop-while-you-wait Polaroid film.



Polaroid system of sonar-ranging (detailed above) uses a transducer next to lens. The transducer sends out sound waves, echoes of which are processed by computerized (digital) and normal (analog) circuits. The Canon AL-1 (left) uses charge-coupled devices to autofocus. Incoming light is split into three beams. Each hits a CCD and the camera's on-board microprocessor interprets results and suggests focus.

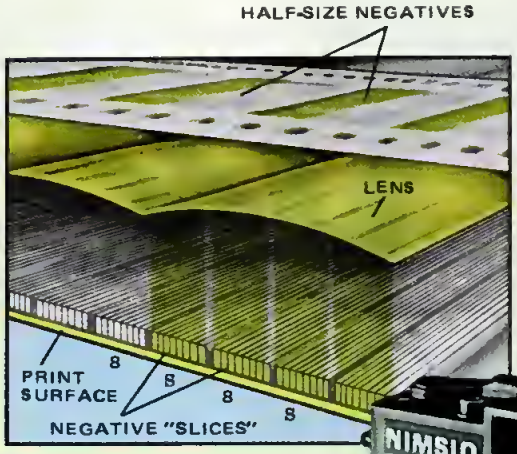
Split to focus

Canon's new system of autofocus departs dramatically from the sonar style. The Canon AL-1 is loaded with leading-edge, electronic technology in the form of three charge-coupled device (CCD) integrated circuits.

When you first pick up the camera and look into its ground-glass viewfinder, nothing seems unusual. But when you begin to focus on something and press the shutter lightly, the magic begins.

As an object comes into focus, three tiny indicators in the viewfinder guide you to focusing perfection. A left- or right-pointing, red

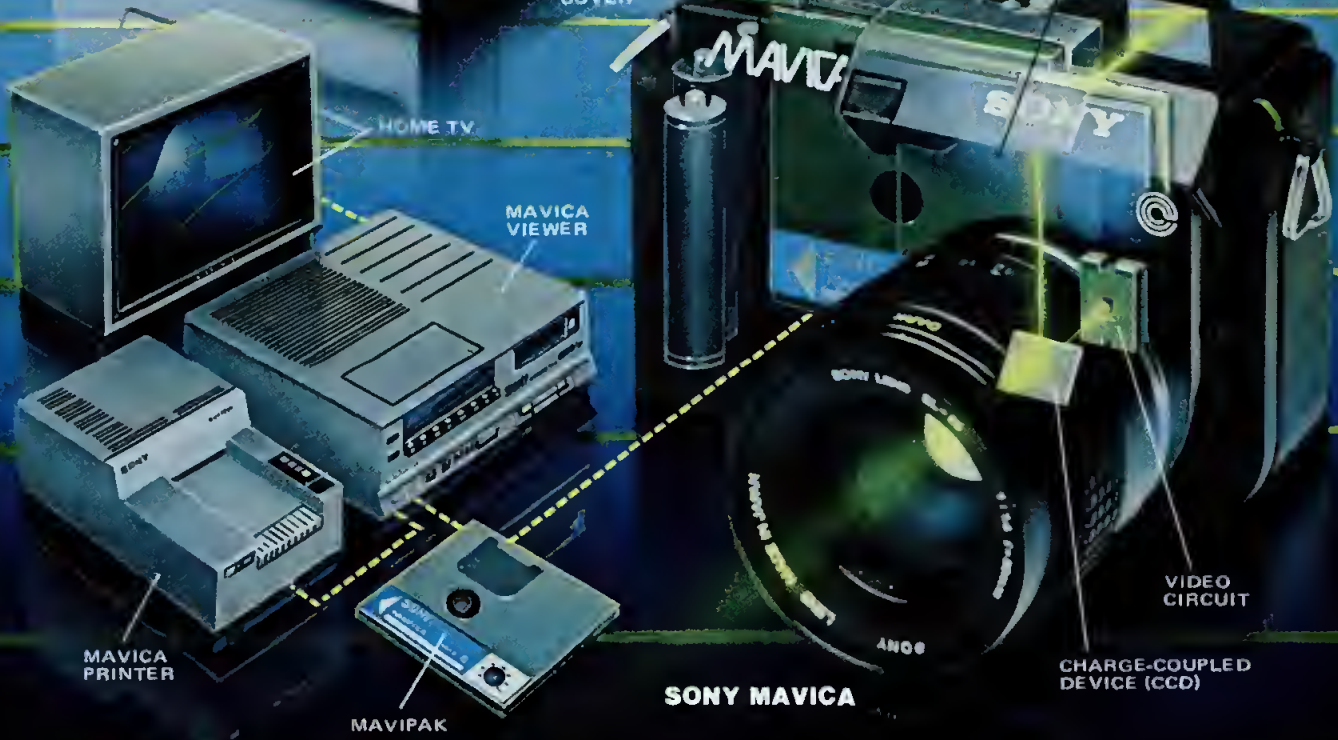
(Please turn to page 185)



Nimslo 3D's four lenses use half-size negatives. Each carries scene from different viewpoint. Negatives are sliced and arranged beneath lenses which cover print. Lenses blend image for 3-D. The Kodak Disc 8000 has new disc film, autoadvance, autoflash and great depth of field. Sony Mavica uses no film; it stores picture electronically in Mavipak.

NIMSLO 3D

KODAK DISC 8000



SONY MAVICA

'83 CARS

Amidst the weeping and gnashing of teeth, Detroit is fighting hard to earn your car-buying dollar. With some interesting variations on established themes, it wants to make you an offer you can't refuse.

Driving The '83 GM Cars

This year GM tries to right the wrongs of the past with more exciting cars.

Camaro (left) is available with a five-speed gearbox, something it should have had from the start. At right: Pontiac's 6000 gets an injection of muscle with the addition of the 135-hp, HO V6; Goodyear Eagle GTs, alloy wheels and suspension modifications round out the super STE package. Hurst Olds, with HO engine and chunky tires, looks like a NASCAR stocker. With new five-speed and 2.0-liter, fuel-injected engine, Cadillac Cimarron is now less anemic and somewhat more willing.

The only things ringing the General Motors cash registers these days are the recently introduced Camaro/Firebird twins. Dealers are clamoring for more of them and the public—unemployment, recession and all—has somehow *found* the money to buy these exciting new cars. And not only are they buying them, but the majority of these F-cars are going out the door in the full battle dress of Z-28s and Trans Ams, the versions with the highest ticket and the biggest built-in profit margin.

Shorn of all chrome and minus the screaming chicken hood decals, they have thrown GM's hidebound market surveys and buyer profiles totally out of calibration—hopefully for good.

For the '83 model year, GM seems to have readjusted its thinking to reflect this "new-found" soft spot in the psyche of the American car-buying public.

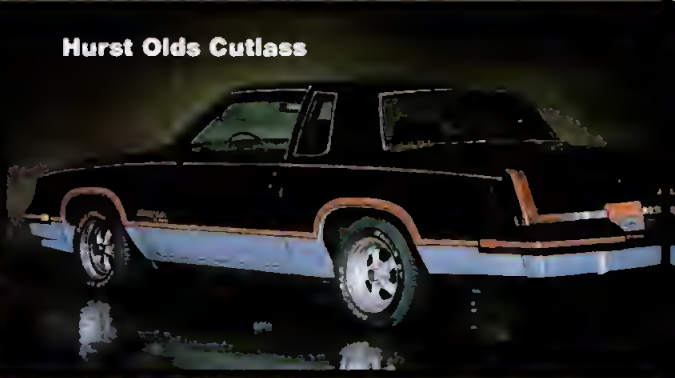
A prime example of this sort of new-think is the Pontiac 6000 STE. Last year's 6000 was decent enough. It more than matched the standards of ride quality and handling that had previously been the domain of German/Japanese manufacturers. What it lacked was punch. This year the punch *is* there in the form of the potent, 135-hp, 2.8-liter, high-output V6 engine. This motor in the Citation elevated the X-11 to near supercar status (see *PM Road Test: An American Sport Coupe Takes On Four Imports*, page 88, Jan. '82). It should do the same for the STE.

Along with the motor is a suspension that will get the power to the

(Please turn to page 206)

1982 Chevy Blazer
1983 Chevy Blazer

Pontiac 6000 STE


Hurst Olds Cutlass

Cadillac Cimarron

Driving The '83 Fords

The fastest gets faster and the good get better.

by Gary Witzenburg
DETROIT EDITOR

Mustang convertible

PM photos: Buzz Frietag

Lynx RS

I was hanging on for dear life as Dan Rivard, one of Ford's top engineers, showed me the proper lines through each turn of the famed Dearborn Proving Ground handling course. He is the in-house master of the track, having learned its finer points from no less a talent than former World Driving Champion Jackie Stewart. Left, right, left, drift it sideways out to here, stand on it and rocket down the straight . . .

He was also demonstrating the finer points of the '83 Mustang GT: *more* horsepower, better handling, shorter (higher-performance) axle ratio, and a *five-speed* transmission! Last year's five-liter V8, four-speed Mustang GT (and Capri RS) were plenty fast (about 7.5 seconds 0 to 60) and cornered pretty well. But this year's make last year's look downright docile.

Wait a minute! Are we in some sort of time warp? Have we time-traveled back to the mid-1960s when cars used to be fun?

No. This is definitely the summer of '82, and the Ford folks are showing us their new stuff for '83. But in the last couple of years there's been a fundamental change in the company's entire attitude and in the way it's building cars.

Ford has realized that building boring, chrome-laden, slab-sided bricks on wheels just isn't going to cut it any more; and the Ford people have decided to stick their collective necks way

(Please turn to page 181)

Mustang 5.0-liter

Convertible Mustang is available with the potent 5.0-liter V8 and a new five-speed gearbox. Upratad suapension improves handling of last year's modal. G-force fans will have a ball getting a stiff neck in aimilarly equipped Mercury Capri. Lynx RS benefita from tha addition of fuel injection to ita 1.6-liter Four. Suapension improvemants will turn it (and the Eacort GT) into economy road racera. Mercury Cougar and Ford Thunderbird are the first examplaa of tha naw-wave thinking at Ford. Rounded aerodynamic styling appeara to be the look of tha future for Ford.

Mercury Cougar

Ford Thunderbird

Driving The '83

Can Chrysler lovers learn to live without chrome?

by Gary Witzenburg DETROIT EDITOR

Dodge 600 ES

This is a year of transition for Chrysler. Although they've recently become solvent, with $800 million or so in the bank from selling off the defense works, they haven't quite had the time to translate those dollars into major new cars. Nonetheless, Chrysler has done a creditable job of refining and honing their existing hardware, while adding two new nameplates to the line, the Chrysler E Class and the Dodge 600, both based on last year's LeBaron/400 twins.

Compared to the LeBaron/400, the new E Class and 600 four-door sedans are stretched three inches in wheelbase and 4.4 inches in overall length, with the bulk of that added size going to a 1.5-inch increase in rear legroom and 2.1 cu.ft. more trunk capacity—17.1 vs. the LeBaron/400's 15.0. Front and rear styling are unchanged, but the new, slightly larger cars are distinguished visually by a fairly clean-looking, six-window roofline vs. the LeBaron/400's dated, padded-roof/opera-window design.

Dodge 600 ES, with sports suspension and a new five-speed, is a real driver's car.

Drive trains are essentially identical, with an improved 2.2-liter Chrysler Four standard and the Mitsubishi "Silent Shaft" 2.6-liter Four optional, both with standard three-speed automatic transaxle. Anticipated EPA economy ratings are 23 mpg city, 32 highway with the 2.2

(Please turn to page 200)

Chryslers

Dodge Charger

Aries Convertible

Nonchromed and well suspended, the Dodge 600 ES is Chrysler's bid for Euro-sedan motoring. It's probably the handsomest car in the lineup. Charger gets a stronger 2.2-liter engine and a five-speed manual. Fresh-air fiends can get their K-car convertible with full leather interior, but rear seats are still for children or jockeys. Sapporo/Challenger, one of the all-time sleepers, receives a sophisticated electronics dash package for '83.

Plymouth Sapporo

Driving The '83 AMCs

Alliance: Another contender for the economy car wars.

by Michael Lamm
WEST COAST EDITOR

PM photos by the author

Let's not kid ourselves. As the 1983 Alliance goes, so goes AMC's future. There's an awful lot riding on this car, more than on any automobile since Chrysler introduced the K-cars. It's extremely important to AMC that the Alliance succeed. Personally, I believe it will.

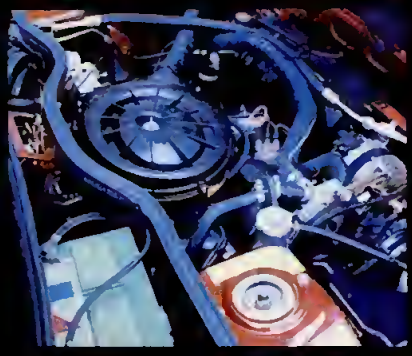
The Alliance arises from the recent partnership (or alliance) of American Motors and the French automaking giant, Renault. Manufacture becomes a joint venture in which AMC builds 75 percent of the car in Kenosha, Wis., and Renault takes care of the other 25 percent—notably the power train—in France.

In addition, Renault has put up much of the money for the Alliance. AMC, for its part, has sunk $100 million into new and modernized plant facilities. Renault designed the Alliance, which is known as the R9 on the continent. It was Europe's car of the year and a runaway best-seller; it has a good chance to repeat that success in America.

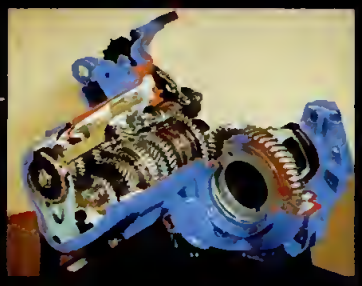
I drove a pilot version this past June and found that it offers everything you could want in an economy car: low base price, up to 50 mpg on the highway, ample performance, a good quiet ride, lots of room and comfort, decent workmanship and quality, some astute engineering touches, and just enough innovation to make the car interesting and fun.

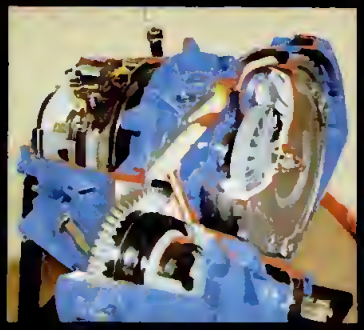
On the face of it, there's really nothing to distinguish this front-

(Please turn to page 201)



Four-door Alliance (left and below) has nicely laid out instruments and controls (top). Vital fluids monitor (center above) keeps eye on oil, water, transaxle and power steering fluid levels. The 1.4-liter engine (above) is a reworked R5 motor with fuel injection added. Manual five-speed (below left) and electronically controlled automatic (bottom left) boost mileage to real-world 40+ mpg.





Fine New Fibers Fight The Cold

Thinner synthetic filaments are holding more trapped air for insulation that claims to be better than the birds'.

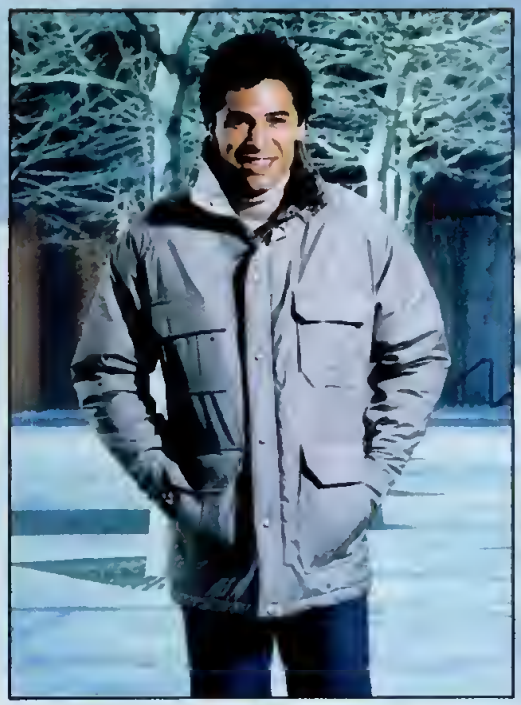
by Bill McKeown OUTDOORS EDITOR

Mountaineers (above) have tested the Celanese Fortrel PolarGuard in gloves, mittens, jackets, vests, pants and sleeping bags. The continuous-filament polyester fiberfill is from Reliance Products, Oakland, Calif. Everest climber John Roskelley (right) was first to field-test Du Pont's new Quallofil polyester fiber.

Chicks and ducks and geese better scurry if they're going to keep up with the latest developments in man-made feather fuzz. The grow-their-own insulation that waterfowl, especially, sprout for foul weather warmth is being imitated and improved on again this year by textile fiber chemists.

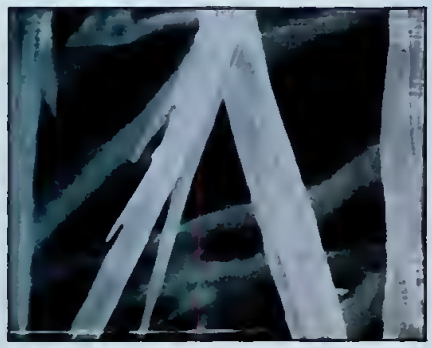
Down still fluffs up as the most efficient-for-its-weight insulator—if you're a goose. But once the feather plumules are stuffed between layers of fabric, they lose "loft" (their fluffiness) when they get wet and they scatter into far corners unless they are trapped in place with quilted stitching. Research engineers now are producing extra-thin synthetic filaments that resemble down more closely. These can hold a boundary layer of dead air and keep body warmth from escaping, yet reduce somewhat the balloon look of current cold-weather clothes, and at much less cost.

Basic insulation fillers for clothing can be divided into down, which by law must have a high percentage of goose and duck down; "down-type" fillers, which often are adulterated with feathers and fibers; synthetic fiberfill, usually made of polyester and olefin compounds; and various foams and organic compounds. No product can match all



Sleeping bags filled with polyester fiber, such as the Slumberjack above that uses Eastman Kodak's Kodel-brand KodOfill, absorb minimum moisture. Woolrich Mountain Parka (left) has 3M's Thinsulate for warmth.

Under an electron microscope, Thinsulate shows a fiber mix that traps and holds air.



At the same magnification, part of a down plumule displays similar holding surfaces.

Enlarged even more, Du Pont's new Quallofil fibers reveal four air tubes per strand.

the features of down, but some of the newest synthetics surpass it in notable ways.

Man-made fibers, for example, at about $1 a pound compare favorably with $40-a-pound down, although roughly 15 percent more weight in synthetics is required to equal the warmth-retention properties of down. The weight difference starts to even out, however, when extensive stitching must be added to quilt the down into pockets so that it does not settle out of place. Fabric to enclose the down must also be of a tight weave or treated to prevent "percolation," the name used to describe the way down can work out through cloth and escape. Some forms of chopped staple also require quilting, but others, with long continuous filaments, do not.

Down, unfortunately, loses its loft and insulating ability rapidly when it gets wet, and then takes a long time to dry out. The new synthetics, in contrast, absorb only about one percent of their weight when wet, and dry many times faster than down. They can take machine washing with ease, and sometimes dry cleaning, lose little of their loft when wet, do not cause allergies, and resist moths and mildew.

In theory—and in dry regions and

(Please turn to page 202)

WHERE ARE THE RUSSIANS HEADED NEXT?

Just 25 years after launching Sputnik I, the first man-made satellite, Russia is preparing for manned exploration of the planets.

by James Oberg

A Soyuz-type manned craft would release a tethered dirigible which would float toward Venua (above). And on Callato, a moon of Jupiter, cosmonauts would scrape dirty ice, and spray it protectively over a makeshift shelter (right).

Unmanned landings on Venus have become a Soviet space program ritual, taking off like clockwork every three years since 1972. But last March's double landing on the nearby planet made the biggest splash yet, when one of two Venera landers sent photos and data back from the hostile Venusian surface for more than two hours. No previous craft—Russian or American—had survived even half that time in Venus's 900° F. heat.

Space watchers were just catching their breath from the Venus extravaganza when, in June, two Soviet cosmonauts pushed a communications satellite by hand off their orbiting Soyuz spacecraft and into Earth orbit. And, as America was conducting the final Space Shuttle tests in July, the Russians were reminding the rest of the world of

James Oberg, author of four books on space exploration, is a flight activities director for the U.S. Space Shuttle's mission control. His latest book is Mission to Mars.

PM art Paul Alexander

CCCP

A rocket like this "Vertical 1" model, with engines larger than the U.S. Saturn V's, is expected to be on-line for launch soon. The time line shows the progress made by the Soviet program since 1957.

USSR IN SPACE

Mar. '82	**Venera 14** broadcasts data and photos from Venus for over 2 hours
July '80	**Soyuz 35/37** crew stays in space for 185 days
July '78	**Progress 2** "freight craft" carries supplies to Salyut station
July '75	**Apollo-Soyuz program:** First joint manned spaceflight with U.S.
June '75	**Venera 9 and 10** circle Venus to create photo maps
Mar. '72	**Venera 9** lands on Venus and transmits first data
Oct. '69	**Soyuz 6, 7 and 8** launch a record seven men in space
Jan. '69	**Soyuz 4 and 5** crews practice space rescue in orbit
	Venera 5 enters Venus atmosphere; impact is presumed
Sept. '66	First unannounced Soviet launch detected when payload explodes
Mar. '65	**Voshkod 2:** First "spacewalk"
Oct. '64	**Voshkod 1** returns first multiman crew after 18 orbits
Apr. '61	**Vostok 1** puts first man into space for one Earth orbit
Aug. '60	**Sputnik V** is first orbiter to return to Earth with live dogs
Nov. '57	**Sputnik II** carries live dog into Earth orbit
Oct. '57	**Sputnik I**

their own prowess in long-term, manned space flight by sending a French astronaut aloft to join a Soviet crew already orbiting Earth for weeks.

As the 25th anniversary of Sputnik I approaches (launched Oct. 4, 1957), many of the world's leading space scientists are speculating on what the Russians are up to in outer space.

Of course, some of the more grandiose predictions made decades ago have not come true. No country has established a Moon base or an orbiting space platform from which rockets might be launched. But *most* of the predictions have come true: the Russian landings on Venus, America's landing on Mars and the extension of space endurance records to half-year flights. These elements give us ample reason to conjecture about what's next.

Venus flyby

Space watchers expect some kind of fireworks this fall to mark the 25th anniversary of Sputnik. There have been signs that Soviets might go for a new space endurance record with a crew that would be entering its third month in space in October. By launching a freighter rocket loaded with supplies, the Soviets might keep the crew in the cosmos for a record four months or longer. Or they might launch a multinational flight of space workers to join the Russians in space as the Frenchman did earlier in the year. But no matter what the Russians do this year, the most spectacular possible project of the decade remains at least a few years off.

Within view is a manned flyby reconnaissance of Venus, Mars or both planets by the same expedition.

PM art: Dean Ellis

The Venusian flyby could be accomplished by current Russian spacecraft, slightly modified to carry along an unmanned, deflated dirigible. The lighter-than-air ship's tether could be dropped by the Soyuz mothership a few miles above Venus's upper atmosphere. Hot hydrogen or carbon dioxide from the Venusian atmosphere would fill the bag. And high temperatures and an atmosphere some 90 times more pressurized than that of Earth would keep the dirigible aloft for days or even weeks. Sensing equipment and cameras aboard the dirigible could send data and pictures back to the mother craft.

The trip would take more than a year, but in the past five years, Salyut 6 and 7 have demonstrated that the Soviets can keep cosmonauts in space for increasingly long periods—the record, held by the Russians, is 185 days. To prepare for that trip, the Soviets will undoubtedly conduct one test mission—probably in lunar or Earth stationary orbit—that puts men in space for about a year.

Soviet doctors have expressed confidence in the cosmonauts' ability to withstand the physical and mental stresses of prolonged "zero gravity" and space radiation exposure. One measure of their confidence was the launching of a cosmonaut—just back from six months in space—into another six-month orbit in 1980 as the last-minute replacement for an injured colleague. The man returned none the worse for his astounding 12 months in space.

Soviet life-support systems are already evolving into "closed-loop" affairs in which water, air and even food can be recycled and produced on

(Please turn to page 183)

PM art Jeff Mangiat

Parachutes would carry dropsondes to Jupiter itself (top right), which would send data back to the Galileo station. On Io (right), Russia may use a "moon walker" to scoop up samples of soil and study the atmosphere, relaying video and other data to mother ship. The walker is made of a highly reflective material to tolerate high-energy rays of Jupiter. A backup tread system in the walker's belly would help it continue the mission if the legs got caught in one of Io's numerous crevices. Artist's concept of walker was based on existing Russian equipment.

P.M. MASTER CRAFTSMAN

Versatile router is a must-own tool for serious woodworkers. Here, V-groove is routed using tacked-on straightedge. The strip against which the router shoe rides must project past the workpiece to prevent mishap when you start the cut.

PM photos by the author

A Craftsman's Secrets For Using A Router

Though it screeches like a banshee, it's the tool you're sure to turn to as your woodworking skills increase.

by Harry Wicks HOME AND SHOP EDITOR

For years, do-it-yourself writers have been saying that "the router is the tool that lets you add a professional touch to your projects." But that statement isn't exactly the truth. Actually, *you* put the professional-looking touch on any project you undertake. What is true is that if you use a router sloppily your project will be sloppy. The name of the game is craftsmanship—*and you supply that.*

As with every other tool in your woodworking shop the router will let you perform those tasks it's designed for almost effortlessly, and in far less time. For openers, recognize that you must spend some time familiarizing yourself with your new router. Get a pile of scrap from the shop scrap box and start making test cuts.

You can begin simply by using the edge-guided bits with pilot bearings and work your way up to such sophisticated cutting as dovetail joints. But first master the tool.

A high-speed tool

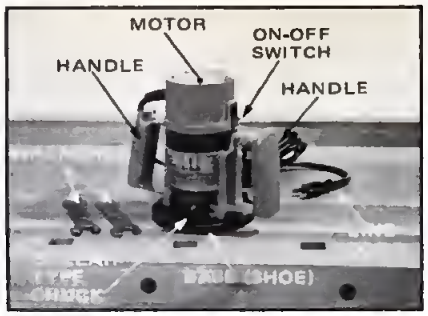
The router is a high-speed tool that performs similarly to the stationary shaper except that it is taken to the workpiece instead of the other way around. It can be used for certain other tasks such as trimming high-pressure plastic laminates, mortising for door hinges and making dovetails.

Routers come with speeds from 20,000 to 28,000 rpm. The reason for the high speed is that many shaped edges will not allow hand sanding; they must be smooth enough to finish as soon as they are made. Thus, if you buy a router with a speed of 25,000 rpm you'll get 50,000 blade passes a minute when you use a two-flute bit. That's impressive.

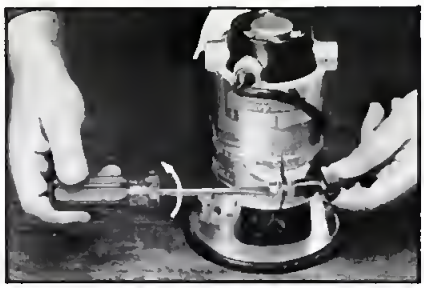
Most routers sold in the United States have a universal motor that operates on a single-phase, 25- to 60-cycle, a.c. or d.c. circuit of the same voltage as shown on the tool's name-

(Please turn to page 188)

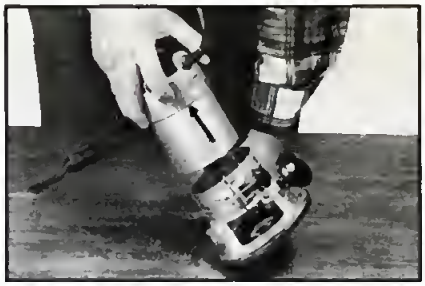
GENERAL INFORMATION



The typical do-it-yourselfer router consists of two basic parts: the motor which holds the bit and the base section for holding and guiding the working half of the tool.

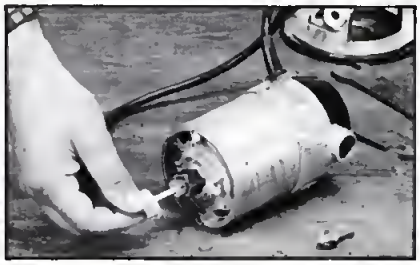


To change cutters, start by loosening the device holding motor in base. Here it's held by a thumbnut and slotted machine screw.

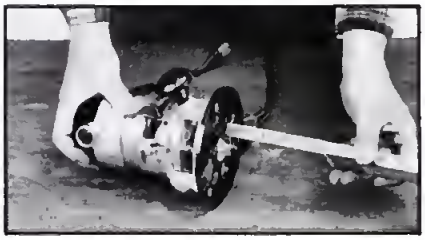


Quickest way to change bits is to then separate the motor and base, as here. Bit can be changed with unit intact, if preferred.

Manufacturer supplies wrenches needed for loosening the split (nut) collet. Pressure is exerted as indicated by the arrows.



Insert the router bit all the way, then withdraw it about 1/16 in. to allow for expansion (left). When shank is at the desired position, retighten the collet using wrenches (right).



To set cutter depth, you can use a scaled ring supplied on many routers or simply check the bit with a ruler (as many pros do). Here, rabbet cutter is set to 3/8 in. depth.

Another easy method is to hold installed cutter against a marked workpiece. Waste is marked with an X to prevent miscut.

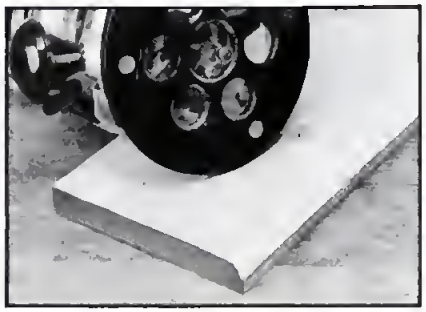
Finished rabbeted edge is cut using the bit set as shown in preceding photos. The cut is right on the mark, as it should be.

Installing and removing a bit from a router varies slightly from one brand to another but, basically, the how-to procedure is quite similar. The router, in fact, grips a bit by its shank, somewhat like a drill grips a drill bit. The difference is that instead of three jaws closing around the shank, most routers have a split-nut collet which closes tightly as a second nut is tightened.

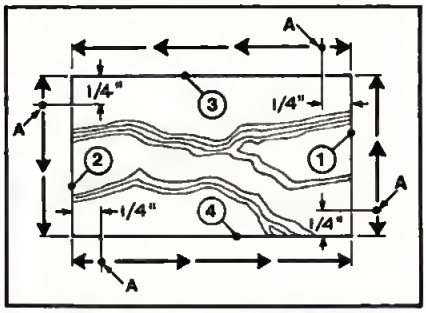
Read the instruction book packed with your tool for the correct how-to.

MAKING AN EDGE CUT

Correct way to shape an edge using a cutter with pilot bearing: Start the cut about 1/4 in. from left end and push the router into the wood until bearing makes full contact with the board edge. Then move router right.



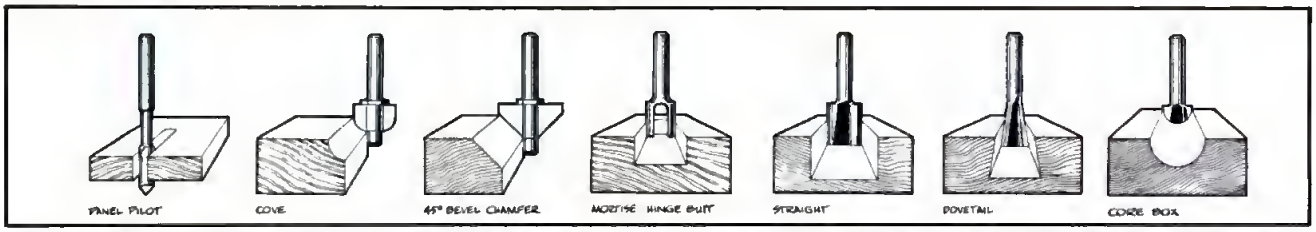
The correct sequence for edge shaping is shown at the right. When this work is handled in the proper manner, the router affords a neat edge, as shown above.



This is the sequence to use when routing all four edges. Always shape the end grains (1 and 2) first, then finish up by making the with-the-grain passes (3 and 4). Points A are the starting points for all four of the edges as shown in the diagram above.

Since a router bit revolves clockwise as you look down on it from above, feed the router in a counterclockwise direction when shaping an outside edge. Conversely, if routing an inner edge—that is, a cutout—feed the router in a clockwise manner. The point is to feed the cutter to the work so the cutting edges can do their job. When shaping all four edges use the sequence shown. If you rout just one edge, be sure the pilot doesn't turn the corner.

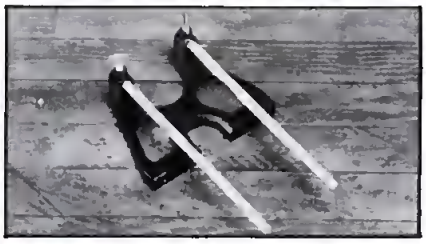
CUTTERS TO HAVE IN YOUR ACCESSORY BOX



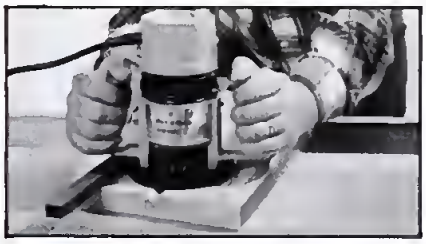
The V-groove and bead bits which are presented on the preceding pages as well as those that are pictured above and on the opposite page are made available in a wide variety of sizes. The methods of using the various bits are spelled out in the text.

GUIDING YOUR ROUTER

With the assistance of an edge guide, it's even possible for you to rout a circle.

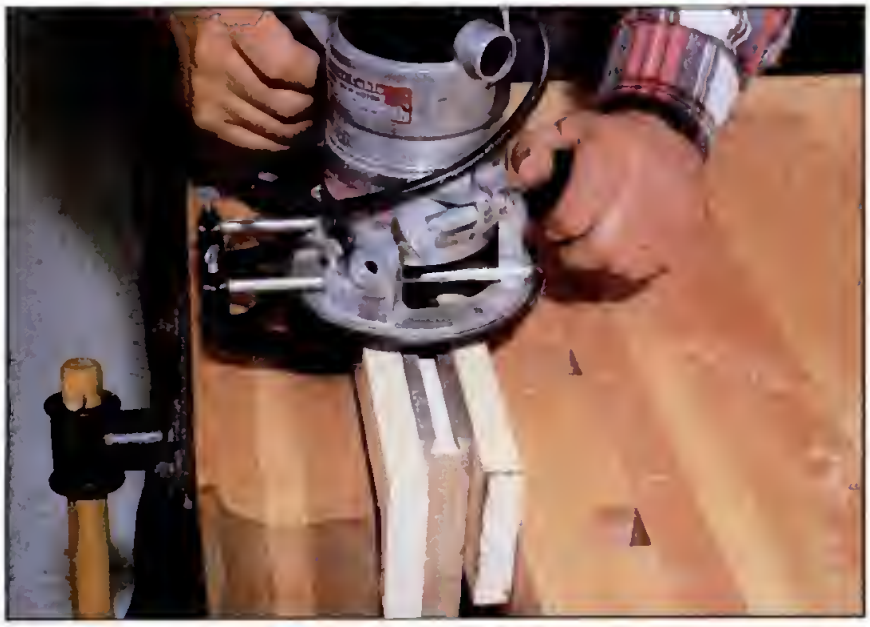


All manufacturers produce edge guides for use with their routers. The guide shown is for the author's Model 150 Rockwell.

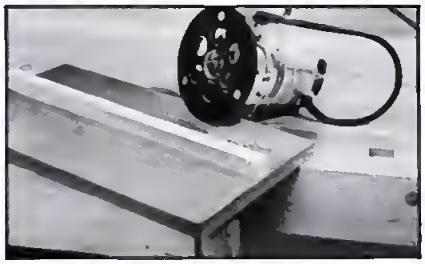


As also seen in the close-up photo on page 114, the projecting guide strip gets the cutter into the workpiece without mishap. The work, in turn, is clamped to the workbench (clamp not visible) to prevent movement.

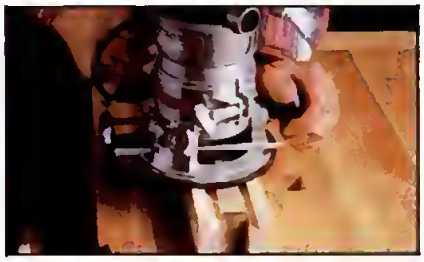
OTHER STUNTS YOU SHOULD KNOW



You can cut dovetails to join boards with the assistance of an edge guide and two pieces of scrap which are clamped on to support the router shoe. In this instance, it is particularly important for you to locate the edge guide accurately.



When face-routing a board it is often impossible to use clamps. Instead, nail-fasten a cleat along the bottom for gripping in the bench vise. Caution: Make certain that the nails are not in cutter's path.



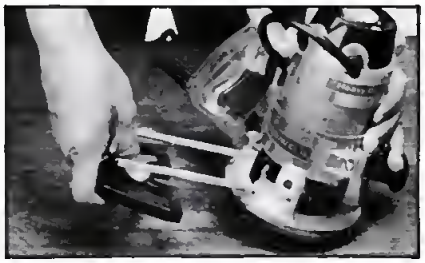
Mortise shape in mating edge is cut using same technique, but cutter is now set to leave center portion (i.e., tenon) intact.

A rounding-over bit might well be the first one you will purchase. This shape is available in at least four radii.

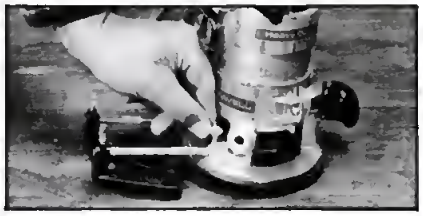
A Roman ogee is also a good bit to own; the shape gives an attractive edge to plaques and the like. By using the lower portion only, you can create a small cove.

Router bits fall into two major classifications—one-piece bits and three-piece screw-type bits. All are of high-quality steel that has been heat-treated for hardness (so the cutting edges will be retained over fairly long periods of use). Steel bits are priced from about $8 to $20 with the three-piecers at the upper limit.

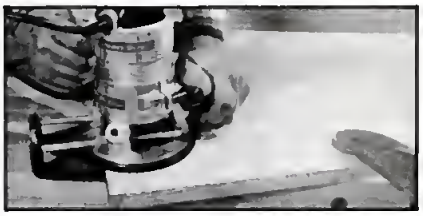
If you plan on doing a lot of woodworking you should consider purchasing carbide-tipped bits in those shapes you'll use most often. These start at about $18.



The edge guide on this router is installed into two holes built into the router base.



Thumbscrews are finger-tightened so that the rods are secure, but movable. Next, the router is turned over and guide set the desired distance from bit using a ruler.



Thumbscrews are securely tightened; you might damage the workpiece if it should shift. To cut, set guide against board edge and lower spinning cutter into work.

If you buy your router in a kit form, which generally means it comes with a carrying case, the chances are the manufacturer will include a router-edge guide. If not, be sure to buy one.

The router (except when you do freehand routing) must be guided to create the professional-looking finishing touches you want. Thus, when you work with a straight (nonpiloted) bit you'll often need an edge guide.

The guide used to control the router is also handy for cutting along the edge of a board. It is particularly useful for routing decorative grooves parallel to the edge of a board end for cutting grooves on long pieces of lumber. It is frequently used in mortise and dovetail work (facing page).

The edge-guide installation may vary from that shown. But, all edge guides serve the same purpose and in the same manner. Here, the two rods are installed in holes provided on the base. They are held by tightening the machine screws already in the base. The guide is then installed on the rods and slid in or out until the correct distance from bit to guide is obtained. Thumbscrews are then tightened.

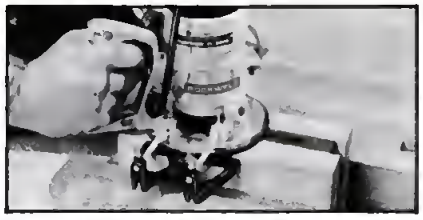
Though some craftsmen measure from bit center to edge guide, I work with dimensions from bit edge to guide.

To start shaping, butt the guide against board edge, tilt-elevate the router to clear the cutter from wood and start the motor. Then lower the cutter into the workpiece.

The router will do far more than simply make decorative edges on boards. Once you have mastered the basics of using it you owe it to yourself to try new techniques. For example, using a dovetail bit and clamps, you can rig a setup for cutting dovetail-shaped "tongue and grooves" on boards to be edge-joined. The resulting joint is strong; viewers will marvel at your craftsmanship.

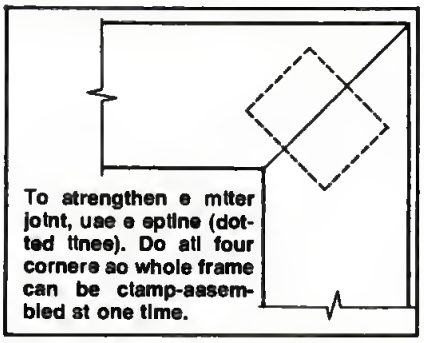
When doing such work, remember that the router shoe must be solidly supported.

When routing freehand, work slowly and always push the router so that the cutter bites the wood as you go: Since the cutter spins clockwise—as you look down on it from above—push from left to right whenever possible. To make an S, for example, start at the bottom and work up.



You can strengthen the otherwise weak miter joint by using splines. To create hidden splines, use your router. Clamp scrap stock on both sides of the workpiece to keep router from wobbling, then grip the setup in the bench vise. It's best to use the edge guide to ensure accuracy.

Cut spine mortises in both workpieces, then fashion the splines to suit openings they will fill. Here, in ¾-in. stock, ½-in. splines will be glued into mortise.



To strengthen a miter joint, use a spline (dotted lines). Do all four corners so whole frame can be clamp-assembled at one time.

The more you use a router, the greater your mastery of the tool will become. Once you are fully comfortable with it, you can try some of the more exotic router tasks such as cutting mortises for hidden splines and freehand routing.

Whenever you rout the narrow edge of a board you should increase the surface that the router shoe will ride on by clamping stock alongside as shown in the photos at far left. The idea is to make certain that the router will not wobble as you make your cut. If it does, damage to the workpiece is almost guaranteed.

Freehand routing is done with a core box or other straight bit. It requires full control by the operator; otherwise the stock will be wasted. The big trick is to work slowly—that is, push the router at a very slow feed rate.

No matter what new technique you try with a router it makes sense to perfect your skills first by practicing with scrap stock.

Double-Deck Porch Adds Two Party Rooms

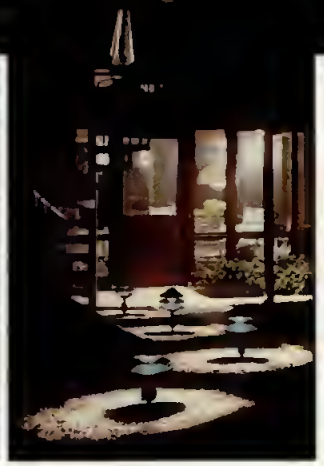
The upper deck is great for sunbathing and entertaining guests. Lighting lets you enjoy it on warm evenings. You can use the porch night and day, any season.

The PM double-deck porch extends the living space on both floors of this home. With sliding doors of the first-floor porch open, the adjoining living room doubles in size. The second-floor master bedroom has a panoramic view through the doors of its adjoining upper deck.

Several considerations were included in designing the two-level space: First, the structure had to blend with the American colonial house—the home of artist Ed Valigursky, whose cover illustrations are well known to PM readers. Second, we wanted to employ the newest construction materials and design ideas. Third, we wanted to join the deck and porch with a stairway fitting the design scheme. Fourth, the porch had to be as open as possible for summer enjoyment, yet enclosed for cold-weather use. Fifth, the porch/deck needed a lighting system.

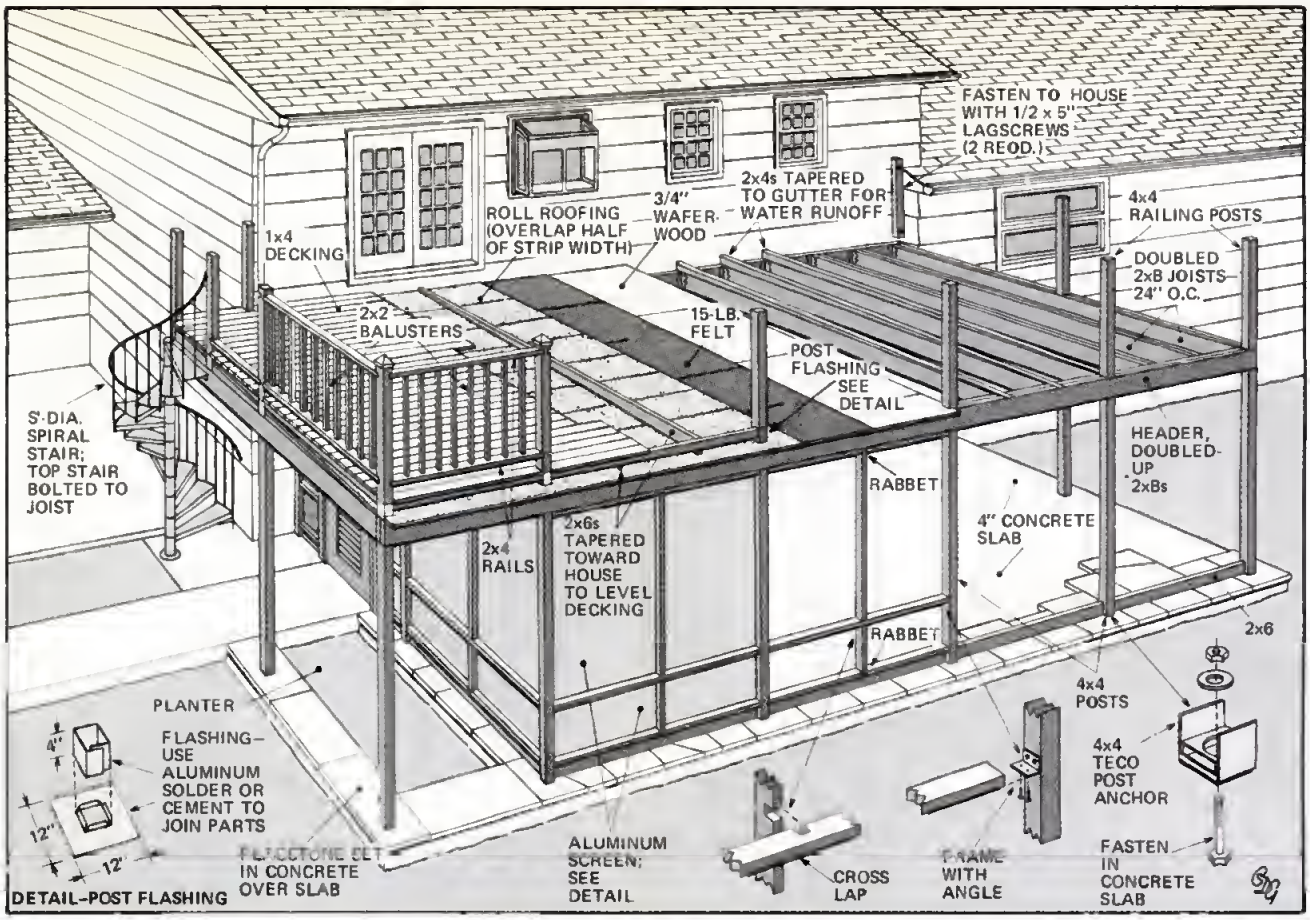
To maintain the colonial feeling, we gave the deck an open look with railings made of simple 2×2 balusters between posts. Hinged French doors with grille inserts give a multipaned colonial "look." Several relatively new design features and materials include: a window greenhouse, decay-resistant, pressure-treated Wolmanized wood, metal construction connectors for strong joints; roof sheathing and finished ceiling panels of Waferwood particleboard. To join the two spaces,

Upper-level sundeck (above) is a delightful vantage point for surveying the scenery while sunning, having lunch or entertaining guests. For evening entertaining, you might prefer moving downstairs to the screened-in room (left). It has an open, airy feeling, yet it's near the kitchen and living room. The room has window panels that seal it for use during cold weather. A galvanized-steel spiral stairway (right) joins the two levels for convenient back-and-forth traffic. Outdoor lights (far right) make this double-deck porch an ideal spot to invite your friends for nighttime parties.



one side of the deck overhangs the porch and neatly accommodates a spiral stairway.

For minimal obstruction to the view, the enclosed porch has a series of windows—the space between each pair of posts is framed into two larger windows on top and two smaller windows directly below; yet permanent screens ensure protection from insects. For cooler times, storm windows made in the shop using bronze-finished aluminum sash are applied over the upper porch windows and fastened in place with screws. Screened openings at the floor are covered from the outside with particleboard panels. During the coldest weather, interior storm windows of PVC film in aluminum sash are applied to the upper windows; interior particleboard panels backed with polystyrene insula-



Support posts and joists have been installed in this view. Note the temporary diagonal bracing on the posts during framing.

Framing of the lower porch is complete. The railing posts on the upper deck are in place and the roll roofing has been installed.

tion cover the lower openings. A portable kerosene heater warms occupants.

Our night lighting system includes mushroom lights for the walkways and a spotlight on the deck.

The concrete slab and flagstone floor on top were already in place. If you must begin by pouring footings and a concrete slab, an excellent reference book is *Concrete Floors On Ground*, No. EB-075, $9.75 postpaid

SHOPPING INFORMATION

All materials used in this porch/deck are available throughout the United States. For buying information or nearest dealer, write directly to these manufacturers: **barbecue grill** (model No. 9740), Structo Div., King-Seeley Thermos Co., Route 7S, Freeport, Ill. 61032; **hinged deck door** (Concept with grilles), **porch storm and screen door,** Pease Industries, 7100 Dixie Hwy., Fairfield, Ohio 45023; **greenhouse window,** JCPenney Co., 1301 Avenue of the Americas, New York, N.Y. 10019; **construction fasteners,** Teco Product & Testing Corp., SS30 Wisconsin Ave., Washington, D.C. 20015; **heater** (Sun Omni 85), portable kerosene, Kero-Sun Inc., Kent, Conn. 06757; **lighting** (wall fixtures, mushroom lights, spotlight), Stoneco Lighting, Keene Corp., 234S Veuxhell Rd., Union, N.J. 07083, **lumber** (Wolmanized) Koppers Co. Inc., 436 Seventh Ave., Pittsburgh, Pa. 15219; **sheathing, ceiling and panels for porch windows** (Waterwood), **sliding porch door and stationary glass panel,** Louisiana-Pacific Corp., 1300 Southwest Fifth Ave., Portland, Ore. 97201; **interior paneling** (Wind Ridge), Champion International Corp., Champion Building Products Div., 1 Champion Plaza, Stamford, Conn. 06921; **semitransparent stain and wood preservative** (Cuprinol nutmeg brown) and **caulking,** Darworth Co., Tower Lane, Box K, Avon, Conn. 06001; **spiral stairs,** 5-ft.-dia. galvanized, The Iron Shop, 400 Reed Rd., Box 128, Broomall, Pa. 19008; **aluminum window sash** (for interior plastic film and exterior glass panels), **plastic film and hardware,** Reynolds Aluminum, Reynolds Metals Co., Richmond, Va. 23261.

Porch and deck furniture: Scibetta Brothers Sunfun, Route 46, Little Ferry, N.J. 07643 (also located at Route 23, Pompton Plains, N.J. 07444; Route 17, Ramsey, N.J. 07446; and Route 10, Whippany, N.J. 07981).

through December from Order Processing, Portland Cement Assn., 5420 Old Orchard Rd., Skokie, Ill. 60077.

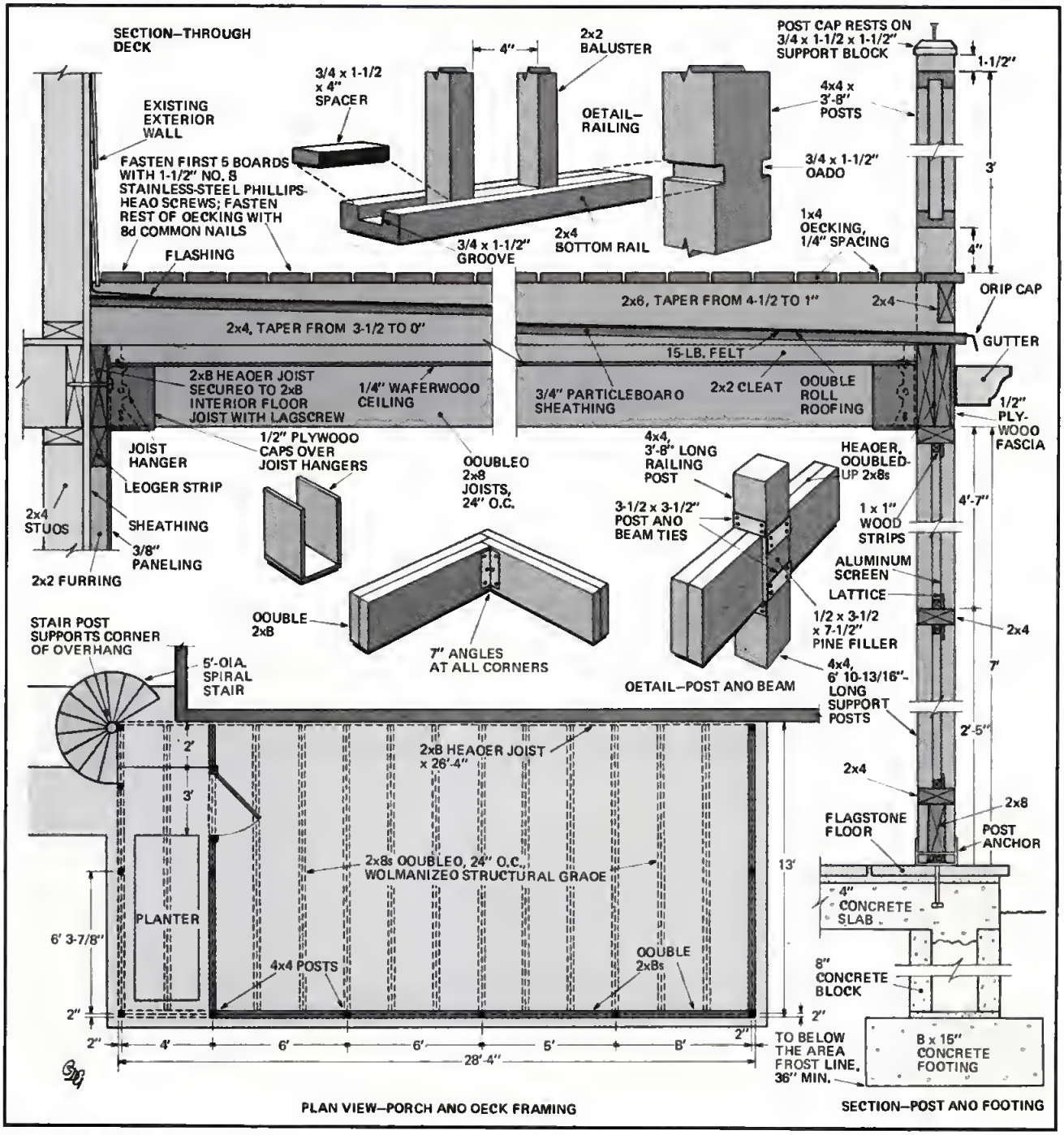
Lay out the header joist along the house wall. If you have access to the deck from the second level, position the header joist so the finished decking will be 2 to 3 in. below the sill of the doorway to the house. In this case, the center of the joist should be about 12 to 13 in. below the proposed sill to allow for decking, tapered boards and roofing materials. Make sure the header joist is level by snapping a level chalkline along the house where the top of the header joist will be.

Strip away siding or shingles so the header can be installed flush against the sheathing and resnap the

(Please turn to page 186)

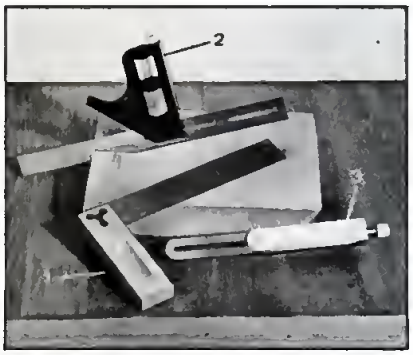
PM photos Keith Scott Morton
Styling Gabe Herrick
Design Lester Walker, AIA
Technical art Carl DeGroote

The detail (left) shows two upper rails joining a capped post. Detail (above) shows a metal post-and-beam tie. Note corner of the joist hanger (top left).



WORKSHOP MINICOURSE

Using squares in the shop



Three types of squares you should heve on hand in your workshop: 1. Try square is used regularly for bench work. 2. The combination square performs several functions. 3. T-bevel square lets you transfer angles quickly.

When board flatness is important, use a square to check as shown. If you find e crown or valley, plane the board flat.

Edges must be absolutely square on all boards to be edge-joined. Use a try or combination square to check this.

After making a crosscut, check for squareness, using try or combination. If cut is out of square, use block plane.

The combination square comes with an accurate 45° angle built into its head. Use it as shown to lay out this angle.

One of the first things a neophyte woodworker learns is that *all* pieces of wood used in a project must be smoothed flat and square (unless, of course, some other shape is called for). If you start a project by first making certain boards are square and true, you will have fewer problems down the line (as you lay out the pieces). Professionals always start by checking the stock to be used—it's a habit you should acquire, as well.

The angle used most often in carpentry is the basic right angle—90°. To help you make perfect right angles there are three types of squares—the try, miter combination and steel. The task at hand determines which you should turn to. For transferring unusual angles, there's the T-bevel square.

The steel square (not shown) is large and flat. Often referred to as a framing square, the steel square has many calculations on it and is shaped in a right angle. We'll talk more about this square in next month's column.

The try square has a hefty wooden or metal handle which is designed to serve as a right-angle fence. The blade is graduated into inches and fractions of an inch. Generally, the try square is used for these three tasks:

1. To test a surface or edge for identical thickness throughout its length.
2. To test an edge or surface for squareness with its adjoining surface or edge.
3. To serve as the guide for marking a line at a right angle to an edge or surface.

The combination square is the tool that combines the best features of the other squares. Besides the 90° angle, the head is shaped to produce an accurate 45° angle. Additionally, the head can be relocated along the blade, which lets you use the instrument as a marking gauge. Other built-in bonuses in a quality combination square include a spirit level bubble and a scribe for marking hardwood or metal. The combination square is the first one to buy.

Perhaps the second is the T-bevel square. This tool consists of a blade, 6 to 12 in. long, with a 45° bevel point at one end. The other end is fitted into a slotted wooden or metal handle equipped with a thumbscrew for securing the blade where desired. The bevel square is especially useful when you must cut a board to fit an existing angle.

More about the joys of being square next month. PM

Popular Mechanics

CAR CARE GUIDE

Build A Sturdy **Garage Workbench**

Make Our Mechanic's Roll-About **Tool Dolly**

25 Car Care Tips From The Pros

First Look Under The Hoods Of The **'83 Detroit Cars**

PM photo: George Ancona

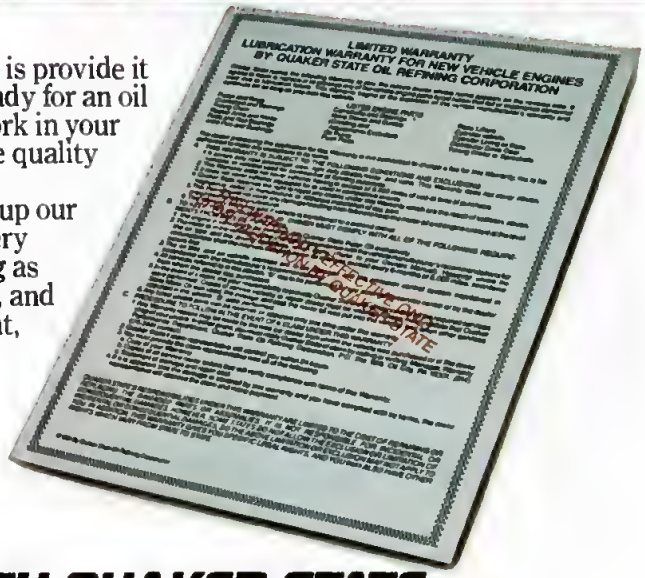
HOW DO YOU KNOW HOW GOOD YOUR MOTOR OIL IS?

"AT QUAKER STATE, WE PUT IT IN WRITING."
Quentin E. Wood
President

Probably the biggest favor you can do your car is provide it with clean, fresh, *quality* motor oil each time it's ready for an oil change. But, since you can't watch a motor oil at work in your car's engine, how do you know you're getting all the quality you've paid for?

At Quaker State, we put it in writing. We back up our quality with a *lifetime* guarantee. We guarantee every new car engine against oil-related failure for as long as you own your car and use Quaker State. For details, and coverage, write Quaker State, Warranty Department, Oil City, PA 16301.

And you don't have to buy a new car to benefit from Quaker State quality. When you put Quaker State in your car—old or new—you're putting in America's quality motor oil. Made only from Pennsylvania Grade Crude Oil.

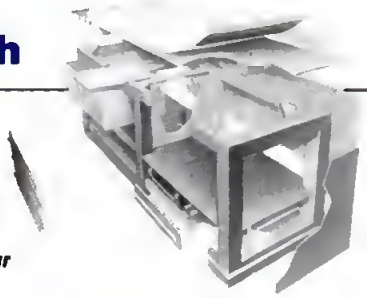

LIMITED WARRANTY
LUBRICATION WARRANTY FOR NEW VEHICLE ENGINES
BY QUAKER STATE OIL REFINING CORPORATION

STAYIN' ON THE ROAD WITH QUAKER STATE

FALL 1982
CAR CARE GUIDE

CONTENTS

Build PM's garage workbench



Rugged and easy-to-build tool dolly (left) and workbench (right) will be indispensable additions to your home garage.

Build PM's tool dolly

What you should know before buying auto parts

SPECIAL SECTION

25 service tips from the pros

SATURDAY MECHANIC LOOKS AT:

The '83 GM cars
Getting serious about power, five-speeds and handling.

The '83 Fords
Would you believe a power dimming rear-view mirror?

The '83 Chryslers
More pep for the 2.2 Four and a turbodiesel pickup.

The '83 AMC cars
Now unlock your car doors with infrared light.

How to find a good mechanic when you can't do it yourself

Prepared by the editors of PM. Contributors: Cliff Gromer, Mort Schultz, Paul Weissler. Car Care Guide designed by Don Mannes. PM art: Fred Wolff, Ed Lipinski and Hank Iken.

MAKES THINGS WORK BETTER!

LOCK-EASE®
GRAPHITED LOCK FLUID

Keeps all locks working smoothly year 'round. Seals out moisture, protects against freezing and rust. Frees frozen and stuck locks. 3.5-oz. aerosol with snorkel; 3.4 oz. can.

SIL-GLYDE®
LUBRICATING COMPOUND

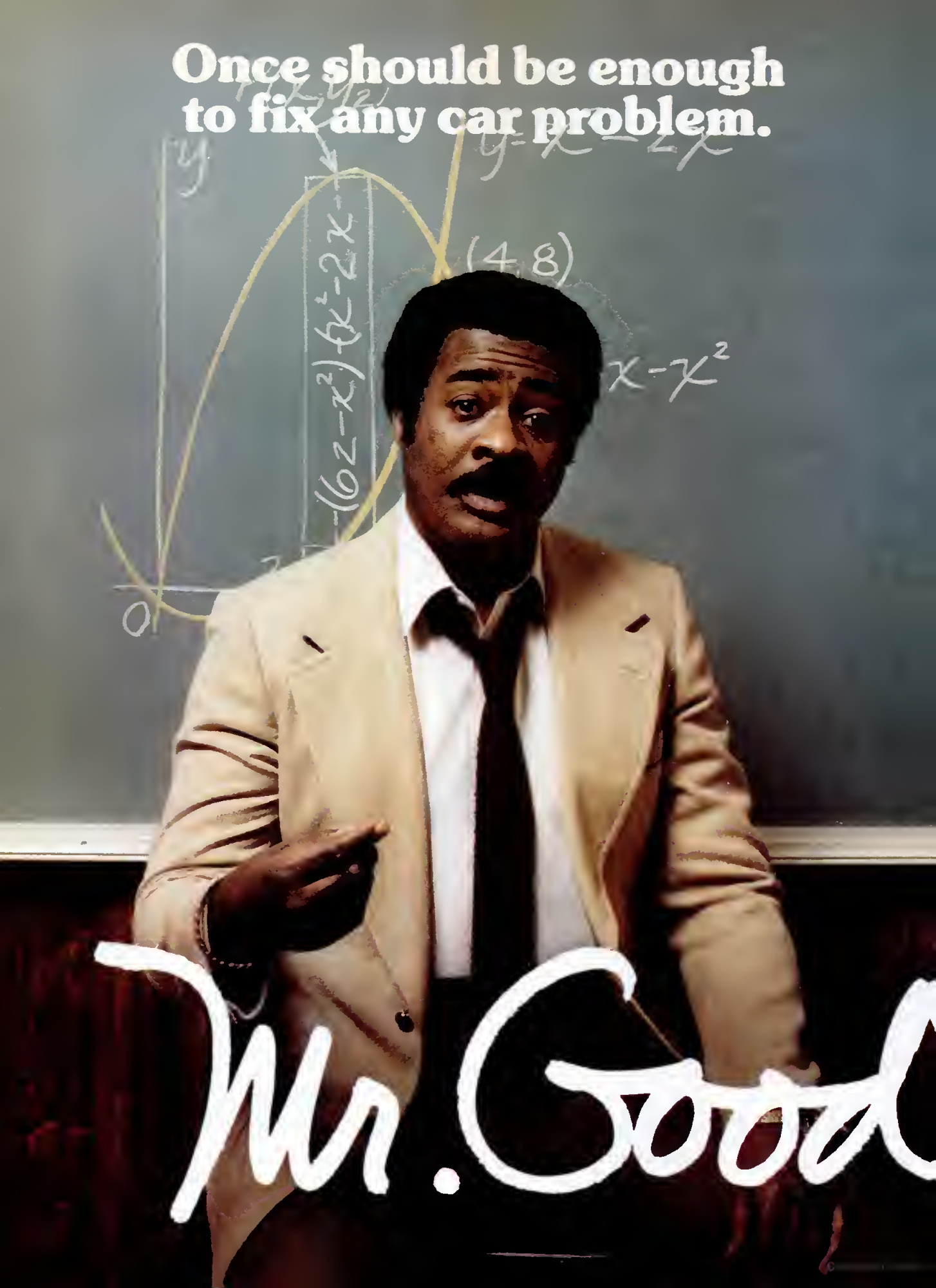
Here is your answer for lubricating almost any surface. Sil-Glyde® is safe to use on rubber, metal, wood and glass. It's weatherproof, too. Performs from 20° below zero. Great for autos, home and sports equipment.

AGS® DRIPLESS OIL
THE "EVERYTHING LUBRICANT" THAT STAYS PUT—WON'T RUN OUT.

Penetrates, loosens rust, lubricates, dries wet surfaces, rust-proofs. It's the best for hinges, flexible cables, fittings, mowers, bicycles, fans, sewing machines, guns, reels, and many other Home- Car- Boat- Sports and Shop applications. 3.4-oz. oiler; 3.5-oz. aerosol.

Available wherever fine automotive and hardware products are sold.

AGS COMPANY
American Grease Stick Co.
Muskegon, Michigan 49443


Once should be enough
to fix any car problem.
Mr. Good

I figure Mr. Goodwrench has the skills and the tools to do the job right.

Mr. Goodwrench has General Motors training. And he works on GM cars every day. To me, it stands to reason that he's the mechanic I should go to when I need service on my General Motors car. That's not all. He has the right tools. And he has genuine GM parts available.

Mr. Goodwrench is committed to reasonable prices—he has pledged to be competitive with other places I could take my car around here for service. I can get a written estimate from Mr. Goodwrench just by asking so I know about what I'm spending before I've spent it. I like that.

So keep that great GM feeling with genuine GM parts at participating independent Mr. Goodwrench dealers selling Chevrolets, Pontiacs, Oldsmobiles, Buicks, Cadillacs, GMC and Chevy trucks.

wrench

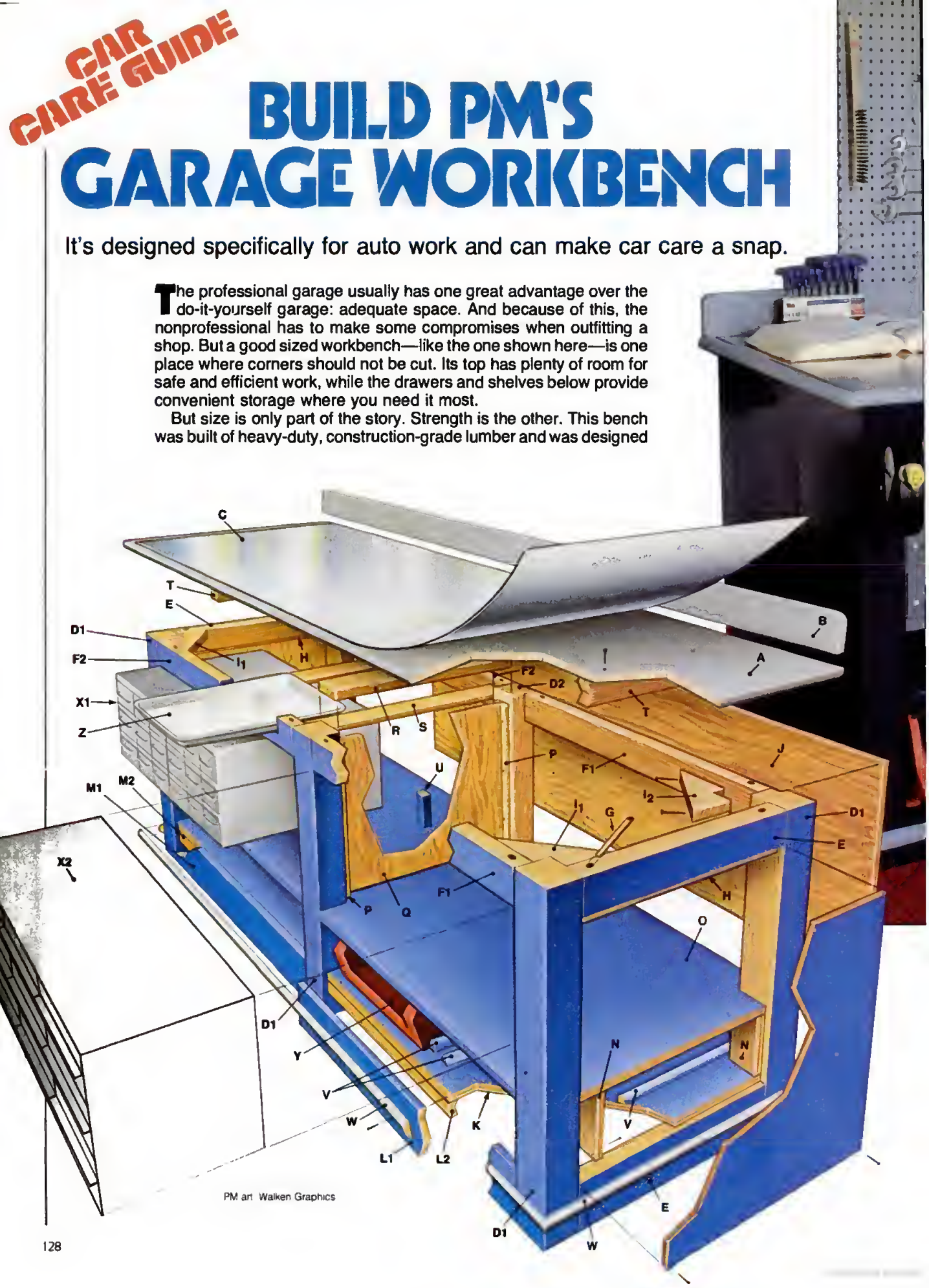
CAR CARE GUIDE

BUILD PM'S GARAGE WORKBENCH

It's designed specifically for auto work and can make car care a snap.

The professional garage usually has one great advantage over the do-it-yourself garage: adequate space. And because of this, the nonprofessional has to make some compromises when outfitting a shop. But a good sized workbench—like the one shown here—is one place where corners should not be cut. Its top has plenty of room for safe and efficient work, while the drawers and shelves below provide convenient storage where you need it most.

But size is only part of the story. Strength is the other. This bench was built of heavy-duty, construction-grade lumber and was designed



PM art Walken Graphics

MATERIALS LIST—GARAGE WORKBENCH

Key	No.	Size and description (use)
A	1	3/4 × 31 1/2 × 88" particleboard (top)
B	1	3/4 × 3 1/2 × 88" particleboard (back splash)
C	1	1/16 × 30 × 86 1/2" sheet aluminum
D1	5	3 1/2 × 3 1/2 × 34" fir (leg)
D2	1	2 3/4 × 3 1/2 × 34" fir (leg)
E	4	1 1/2 × 3 1/2 × 23" fir (rail)
F1	3	1 1/2 × 3 1/2 × 34" fir (rail)
F2	3	1 1/2 × 3 1/2 × 41" fir (rail)
G	20	3/8"-dia × 6" dowel
H	2	3/4 × 3/4 × 23" fir (cleat)
I1	2	1 1/2 × 6 1/2 × 6 1/2" fir (front corner block)
I2	2	1 1/2 × 6 1/2 × 6 1/2" fir (back corner block)
J	1	3/4 × 34 × 80" plywood (back)
K	1	3/4 × 26 1/2 × 84" plywood (bottom)
L1	1	3/4 × 4 1/4 × 34" plywood (toe kick)
L2	1	3/4 × 1 1/2 × 34" plywood (cleat)
M1	1	3/4 × 4 1/4 × 41" plywood (toe kick)
M2	1	3/4 × 1 1/2 × 41" plywood (cleat)
N	6	3/4 × 2 3/4 × 8' plywood (cleat)
O	1	3/4 × 29 1/4 × 84" plywood (shelf)
P	4	3/4 × 3/4 × 19 1/2" plywood (cleat)
Q	1	3/4 × 19 1/2 × 23" plywood (partition)
R	1	1 1/2 × 3 1/2 × 23" fir (top support)
S	2	3/4 × 4 1/2 × 26 1/4' fir (tray support)
T	2	1 1/2 × 3 × 26 1/4" fir (stiffening cleat)
U	1	1 1/2 × 1 1/2 × 4" fir (support leg)
V	†	Quarter-round pine molding (tray guide)
W	150'	Half-round pine molding (trim)
X1*	1	18-drawer metal cabinet
X2*	1	9-drawer metal cabinet
Y**	†	Plastic tray
Z***	1	Metal tray

Misc.: 6d common nails, 1 1/2" and 2 1/2' No. 10 fh screws, glue, sandpeper, primer, paint.

†As required

*Available from: Equipto, 225 South Highland St., Aurora, Ill. 60507.

**Available from Akro-Mils, Box 989, Akron, Ohio 44309

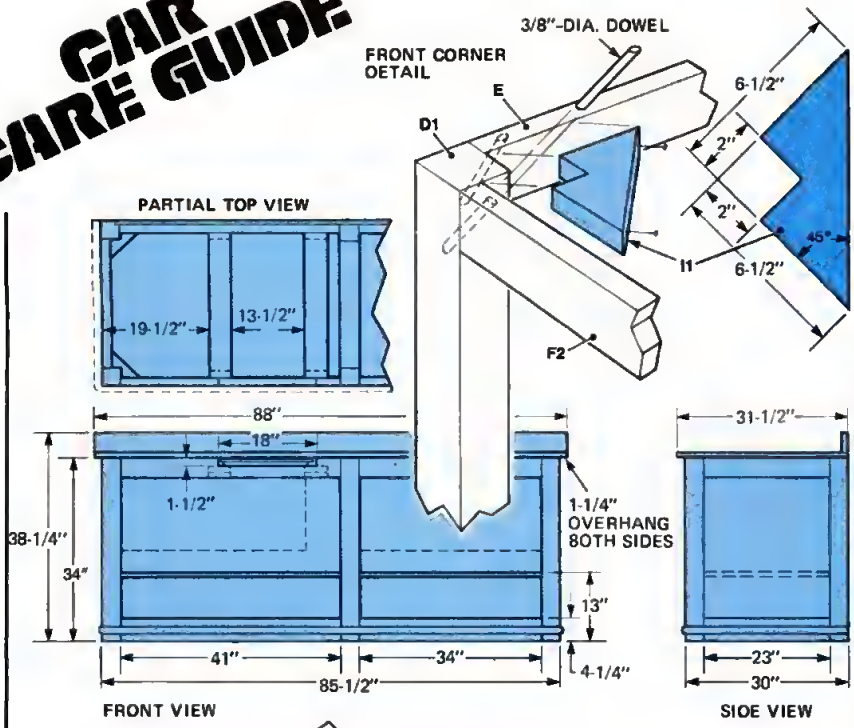
***Available from Any restaurant supply outlet

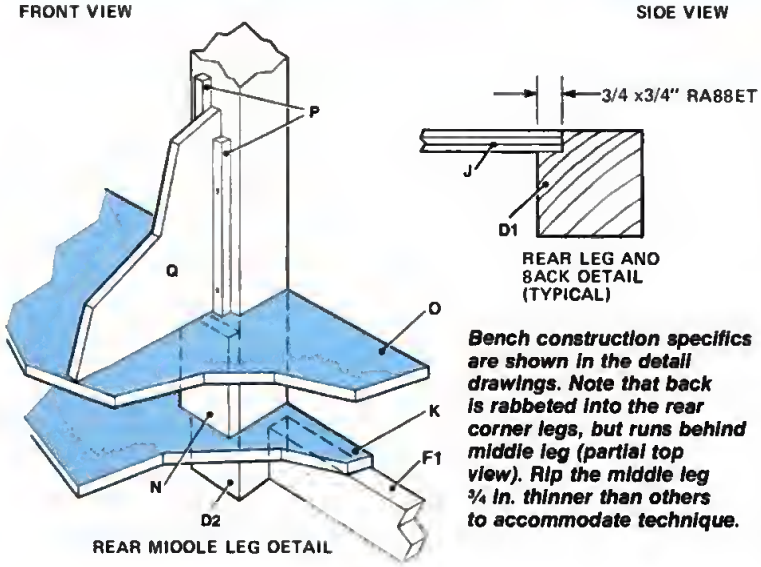
Air hose reel available from C & H Distributors Inc., 400 South Fifth St., Milwaukee, Wis 53204.

This sturdy workbench was built to withstand the unique rigors of heavy-duty auto work. Full-width aluminum top makes oil spills easy to clean and prevents the wood from galling. The shallow, premade metal drawers optimize space for tool and parts storage. Space is provided for an air hose in the center. Other storage space is provided by easy-to-remove and inexpensive plastic trays. These hold larger, hard-to-store parts and groups of tools that are often used together.

Design Tony Assenza Ralph deMasi
Construction Sal Firrantello
PM photos George Ancona

CAR CARE GUIDE





Bench construction specifics are shown in the detail drawings. Note that back is rabbeted into the rear corner legs, but runs behind middle leg (partial top view). Rip the middle leg ¾ in. thinner than others to accommodate technique.

to hold a complete V8 engine without a word of complaint.

Joining legs and rails

Begin construction by cutting all the legs the same length and ripping the rear middle leg ¾ in. thinner than the other five. Then cut a ¾ × ¾-in. rabbet in each rear leg to accept the back.

Cut the upper and lower side rails to length and join them to the end legs, using glue and ⅜-in.-dia. dowels, as shown. We bored the dowel holes at 45° angles for added strength. But if you don't have a drill press with a tilting table to perform this task, use two dowels per joint instead of one and install them conventionally. Clamp the assemblies, check for square and allow them to dry overnight.

Next, cut the remaining rails to length and cut the notch in the left front rail (F2) for the metal tray. Join these rails to the legs as explained above. Be especially careful to clamp these assemblies square. Otherwise the metal drawer cabinets will not fit properly later.

Install the four corner blocks with glue and 2½-in., No. 10 flathead screws. Note that the notches in the front and rear blocks are not the same because the workbench back is rabbeted into the rear legs. The front blocks are shown in the detail drawing above. The rear block notch is 1¼ x 2 in.

Installing bottom and shelf

Join the back to the legs using glue and 6d common nails, then cut the bottom to size and shape. Attach the front support cleats (L2, M2) to the underside of the bottom, and glue and nail the bottom into place. Attach the quarter-round tray guides, allowing ⅛-in. clearance on both sides of each tray. Then attach the toe kicks with glue and 6d common nails. Install the shelf cleats (N), making sure to recess them ¾ in. from the outside of the end legs.

Cut and install the shelf. Attach the rail cleats (H) and install the plywood side panels.

Cut the middle partition and cleats and install. Toenail the top support (R) into the front and rear legs and set the nailheads to prevent the top from rocking once it's in place.

Next, install the tray supports (S) by nailing them into the small cleats shown in the front view detail drawing at left. Or, because they carry little weight, these can be nailed directly in place, using 8d finishing nails driven through the front and rear bench rails.

Top and drawers

Cut and join the top end back splash using glue and 2½-in. No. 10 fh screws. Then position the stiffening cleats (T) on the underside of the top by measuring 18 in. in from both ends and 3 in. in from the front.

Next, attach the cleats with glue and countersink 1½-in., No. 10 fh screws driven down through the top. Because the top is not fastened to the bench, these cleats keep it from moving during heavy use. If you prefer to attach the top, just screw it to the corner blocks from above.

Next, glue end nail the half-round trim pieces to the bench sides and front. Miter the corners. Then sand the entire bench with 100-grit sandpaper; prime and paint.

Now, remove the drawers from the metal cabinets and hang the shelves from the legs and upper front rails. Use wood screws driven from inside the metal shelf. Because the left cabinet is supported only by the upper rail and one leg, it is wise to cut and fit a small wood leg (U) underneath the back right corner. Toenail this block into the shelf, then screw down from the inside rear corner of the cabinet into the top of the block.

Finishing touches

Insert the plastic storage trays, then cut the sheet aluminum to size and place it on the top. To add the multi-outlet fixture shown in the photo, just screw it to the front rail and wire a 12-2 cable with ground, extension-cord pigtail to the back of the fixture. Run the cable above the drawer cabinet and through a hole bored in the workbench back. Plug it into an existing outlet. The air hose reel shown is available from C & H Distributors of Milwaukee (see materials list) and merely hangs from the bottom of the front rail. PM

© 1982 Mobil Oil Corporation

If you're not using Mobil 1® you could be shortchanging your engine.

Mobil 1's unique molecular structure is the reason it lubricates better and helps protect engine parts better against friction and wear than conventional oil. So engines stay cleaner and run smoother.

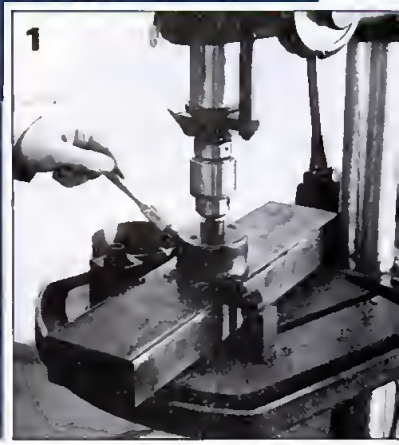
Mobil 1's molecular structure is also the reason it saves gas compared to conventional oil, helps you start at 35°F below and takes you 25,000 miles* (or one year whichever comes first) between oil changes.

Start treating the inside of your car as well as you treat the outside. It doesn't take a lot of effort, just a little Mobil 1.

*Add oil as needed. New car owners follow warranty instructions. Diesel owners follow manufacturer's instructions.

Mobil 1. The oil that saves you gas. And more.

Treat the inside of your car as well as you treat the outside.


1

Build PM's Tool Dolly

Inspired by professional race crews, this easy-to-build dolly can make your pit stops a lot faster.

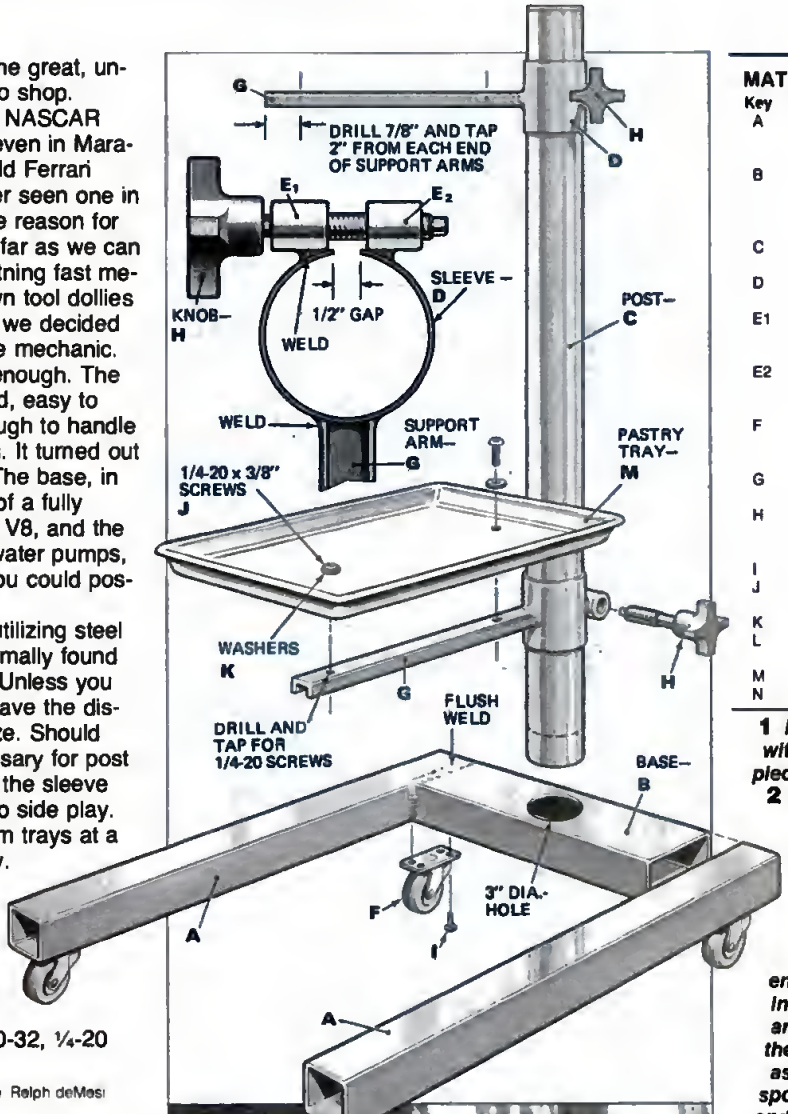
The tool dolly is one of the great, unsung heroes of any auto shop. We've seen them used by NASCAR and USAC pit crews and even in Maranello, Italy, where they build Ferrari street cars. Yet, we'd never seen one in anybody's home shop. The reason for this is simple. Nobody, as far as we can tell, sells them. Those lightning fast mechanics cobble up their own tool dollies for their unique needs. So we decided to design one for the home mechanic.

Our premise was easy enough. The unit had to be easy to build, easy to work with and rugged enough to handle heavy tools and auto parts. It turned out better than we expected. The base, in fact, can carry the weight of a fully dressed Chevy 305-cu.-in. V8, and the two top trays can handle water pumps, distributors and any tool you could possibly use on your car.

Construction is simple, utilizing steel tubing and U-channels normally found at local metal distributors. Unless you have a metal cutoff saw, have the distributor cut all pieces to size. Should any substitutions be necessary for post C or collar D, be sure that the sleeve slides over the post with no side play. We picked up the aluminum trays at a restaurant-supply company.

We used an arc welder, drill press, index table, bench grinder, belt sander and a .103-in.-thick rotary saw. We also needed a center punch, a 3-in. hole saw for metal, 10-32, ¼-20

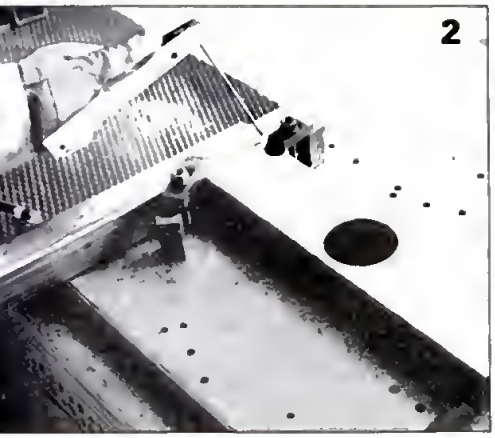
Design and construction Tony Assenza Ralph deMesi
PM photos George Ancona

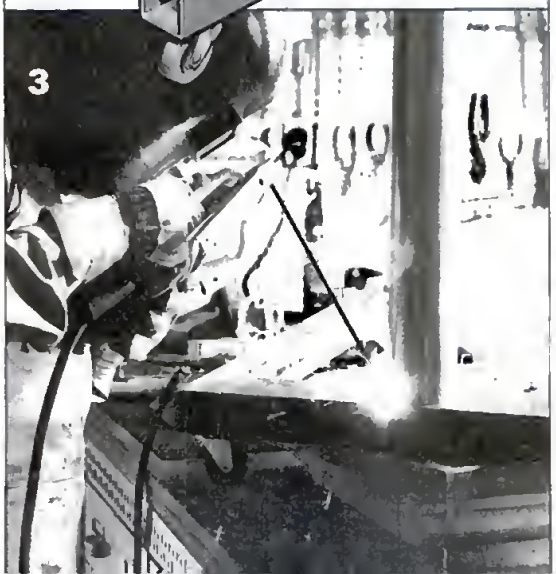


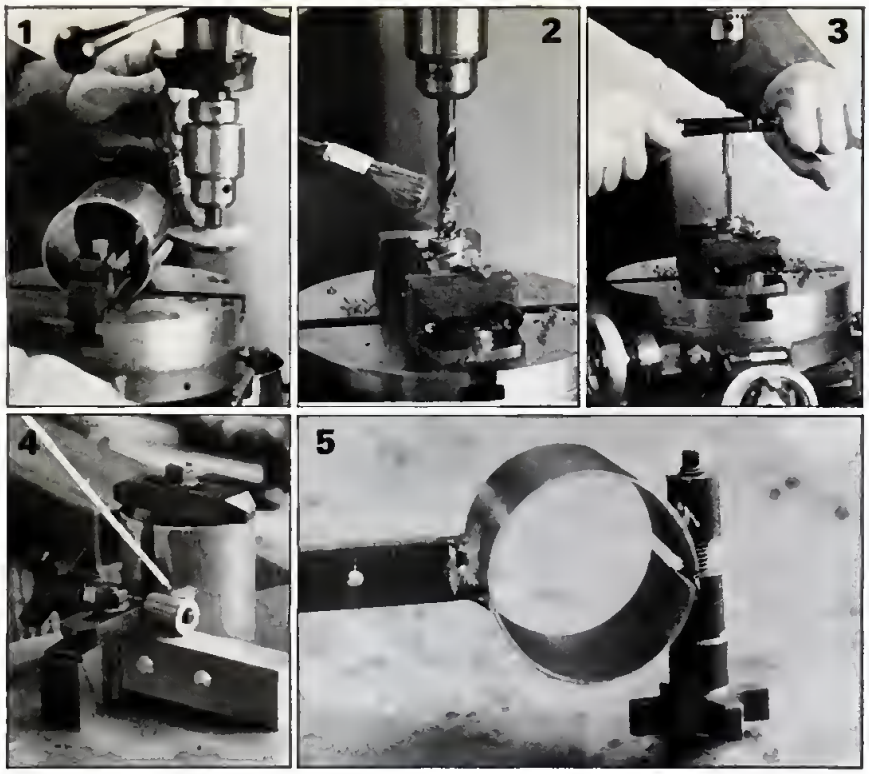
MATERIALS LIST—DOLLY

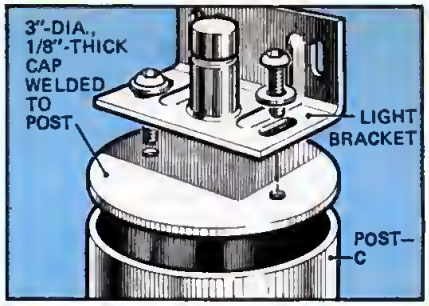
Key	No.	Size, Description (use)
A	2	2 × 2 × 30" main frame legs with ⅛" wall, square tubing
B	1	2 × 4 × 17" main frame center section, rectangular tubing with 1/16" wall
C	1	3 × 3 × 41" post, round tube with ⅛" wall
D	2	3⅛ × 4" round tube with 1/16" wall steel
E1	2	⅞ × ⅞ × 1" clamp sections, ⅜" i.d. steel, drilled only
E2	2	⅞ × ⅞ × 1" clamp sections, ⅜" i.d. steel, drilled and tapped
F	4	1¼ × 2" casters (mounting plate, dimensions)
G	2	½ × 1 × 15" U-channel steel support arms
H	2	½ × 3" knobs with threaded rod, 13 threads per inch
I	16	19/32 × ½" screws
J	6	¼-20 × ⅜" Allen button-head screws
K	6	washers for ¼" screw
L	1	swivel lamp—not shown (optional)
M	2	aluminum trays 13 × 18"
N	1	aluminum tray 26 × 18"

***1** Main base section is cut with a 3-in. hole saw. Hold piece securely with clamps. **2** Build the base frame in a jig; hold it tightly with clamps during the welding. Make sure edges are flush and tight. **3** Once the base frame is welded together, install post, and spot weld it to hold it in place. Then run a bead around the post. **4** Using the caster mounting plate, as shown in photo below, spot, drill and tap the base and install the four casters.*

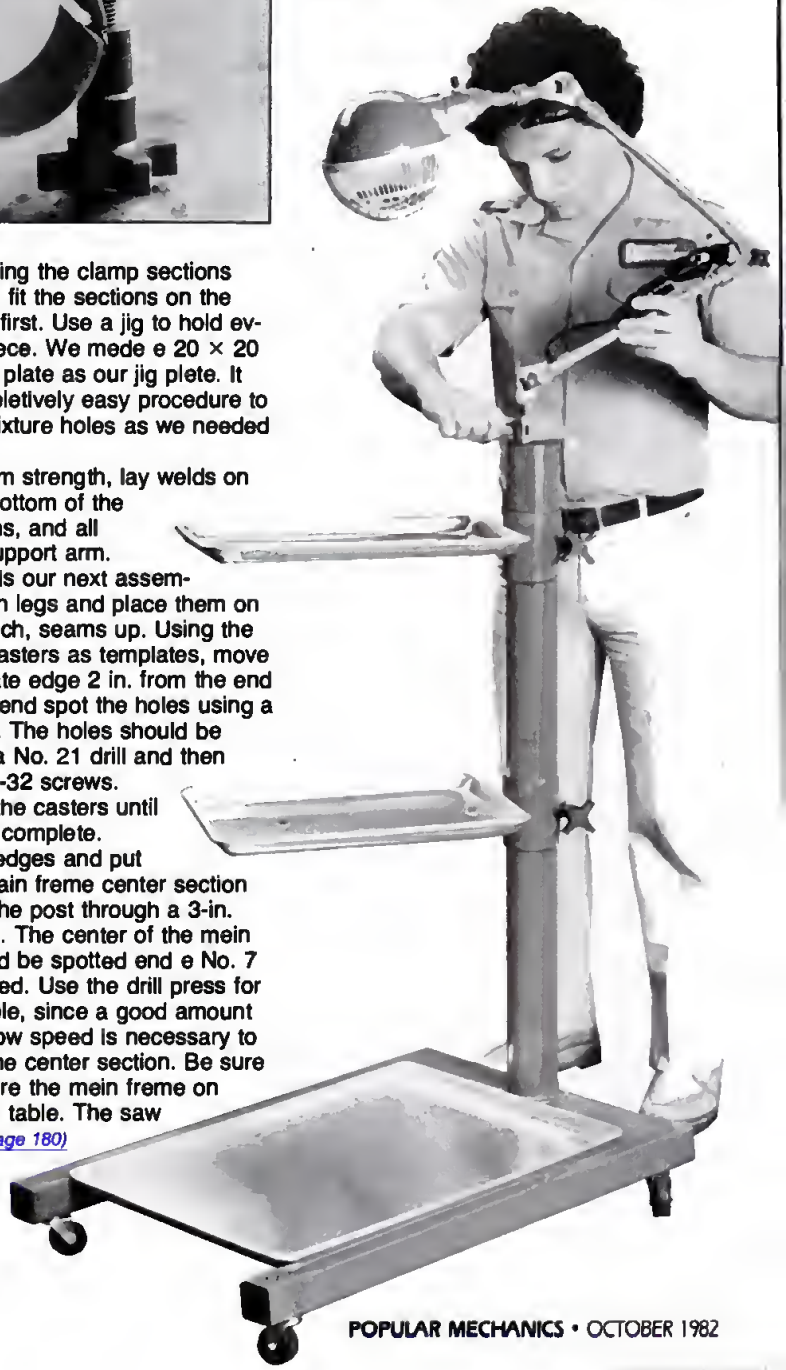








***1** Slot the sleeve on drill press. Secure sleeve on index table with T-nuts, clamps.*
***2, 3** Drill and tap the clamp sections. Two of the clamp sections should be drilled only, the other two drilled and tapped.*
***4** The sleeve assembly should be secured in a jig and held tightly while welding.*
***5** Sleeve assembly with support arm. The detail above is for optional work light.*



end ½-13 taps end tap handle, No. 7, 21 end 21/64-in. drills, a flat end round file, primer spray paint and finish coat.

Hold down the sleeve on the index table by clamps. Fix the clamp securely so the sleeve won't shift when you begin to cut the slot. If the tube has a seam it should be opposite the slot. Feed the work slowly into the blade, using the index table's lateral movement handwheel. While you're cutting, keep the wheel cool with brushed-on water and a water-soluble cooling oil, available at machinists supply outlets. When both collars are done, deburr them.

Next take two of the four 1 × ⅞ × ⅞ in. clamp sections (E1 in diagram) and drill out the center to ½ in., using a table vise and drill press. Deburr using the belt sander. The other two (E2) are drilled out to 21/64 in. and tapped for a ½-13 thread. Don't clamp the clamp sections too tightly; this could distort the inside diameter and make it harder to tap. Use tapping fluid liberally. When finished, deburr them and set aside.

The knobs (H) were located at a machinist's supply house. We picked large knobs for a good grip. When adjusting the tray, grind down the threads on the rod which passes through clamp section E1, closest to the knob itself. This will keep the rod from binding and jamming the sleeve open.

After finishing the clamp sections, take the tray support arm and drill a hole using a No. 7 drill, then thread with a ¼-20 tap. The end you weld onto the sleeve will need a concave shape when seen from above. This can be done on the bench grinder.

When welding the clamp sections to the sleeve, fit the sections on the threaded rod first. Use a jig to hold everything in place. We made a 20 × 20 × ¼-in. steel plate as our jig plate. It was then a relatively easy procedure to drill and tap fixture holes as we needed them.

For optimum strength, lay welds on the top and bottom of the clamp sections, and all around the support arm.

The frame is our next assembly. Take both legs and place them on your workbench, seams up. Using the base of the casters as templates, move the caster plate edge 2 in. from the end of each tube end spot the holes using a center punch. The holes should be drilled using a No. 21 drill and then tapped for 10-32 screws. Don't mount the casters until all welding is complete.

Deburr all edges and put aside. The main frame center section (B) will hold the post through a 3-in. hole in its top. The center of the main section should be spotted and a No. 7 pilot hole drilled. Use the drill press for cutting the hole, since a good amount of torque at low speed is necessary to cut through the center section. Be sure that you secure the main frame on the drill press table. The saw

(Please turn to page 180)

We Back Our R.V. Service Coast to Coast

"If we serve you in Seattle, we'll back you in Paducah."

- ENGINE & DRIVE TRAIN
- BRAKES • ELECTRICAL
- GENERATOR • A/C, HEATING
- REFRIGERATOR • PLUMBING
- ROOF COATING • AWNINGS
- CHEMICALS & SUPPLIES
- HITCHES • LOAD EQUALIZERS
- SWAY CONTROLS • SUSPENSION AIDS
- BRAKE CONTROLS • LIGHTING AIDS
- TRANSMISSION COOLERS • LP GAS

Now there's somebody who backs their R.V. service throughout the U.S. and Canada. No matter where you travel, there's a U-HAUL® REC VEE WORLD℠ and U-HAUL HITCH WORLD℠ nearby to stand behind its parts and service work, coast to coast. U-HAUL has over 1,000 Moving Center locations open seven days a week.

ON-SITE OR IN-SHOP SERVICE
We'll do the job at your place or ours with factory authorized service, parts & supplies.

24-HOUR ROAD SERVICE If you break down while traveling, call 1-800-528-0355 (toll-free).

PARTS, SUPPLIES & ACCESSORIES
Chemicals, directories, maps, hoses, appliances, toilets, pumps, lighting, awnings, TV antennas, tire carriers and more!

COMPLETE TOWING SYSTEMS
U-HAUL HITCH WORLD has everything you need for your tow vehicle and trailer. With over 35 years experience, nobody knows more about trailer towing than U-HAUL.

Hitches for domestic and foreign cars, trucks and motor homes. All from top-brand names such as REESE, DRAW-TITE and VALLEY. Also custom fabrication for unique vehicles and towing needs.

COMPLETE LINE OF TOWING ACCESSORIES
Brake and sway controls, electrical connectors, transmission coolers, ball mounts, suspension aids, tow bars, mirrors and more!

FIND US IN THE WHITE PAGES UNDER U-HAUL MOVING CENTERS.

Join the winning team. We're hiring experienced R.V. technicians. Call Don Noel, 1-800-528-0483.

MICHELIN TRX.

More than you ever expected from a tire. Just what you expect from Michelin.

Michelin, the leader in radial tire technology, has achieved another innovative tire breakthrough — the high performance TRX.

The TRX is the result of years of Michelin research. We took a fresh look at the tire and wheel and redesigned both until they were quite literally made for each other. And then after extensive testing on our proving grounds, the TRX proved itself on the Grand Prix circuit.

A completely new concept in radials for passenger cars, the TRX provides extraordinary cornering and braking, exceptional traction on wet and dry roads, and the ultimate in driving comfort.

Michelin radials have always set the standard for performance and consistent quality. With the TRX, this tradition continues. See your authorized Michelin dealer. Whatever you drive, he has a Michelin 'X' radial for you.

MICHELIN

We put America on radials.

CAR CARE GUIDE

What You Should Know Before BUYING AUTO PARTS

Not all parts are created equal. Amidst the used, rebuilt and even new ones, you just might find some counterfeits.

Which is the real Chrysler part? Look closely: The box at right says it replaces Mopar. It's a cheap copy of the real thing.

The easy part of fixing your own car should be picking up the replacement parts you need to do the job. But is it?

Consider the choices you must make when buying replacement auto parts: Should you buy new, rebuilt or used components? If new, should you look for a factory-made part or one produced by an independent supplier? And that's just the beginning.

Where's the best place to buy the parts you need—a car dealer, auto parts store, discount or so-called "red front" store, or department store? Even your local drug store or supermarket may carry a limited line of auto parts.

Then there's another problem: All auto parts are not created equal. You'll find vast differences in parts designed for the same application—differences that can mean poor performance, premature failure, potential safety hazard, or maybe just a part that flat-out won't fit.

Parts that go into a new car at the factory are called original equipment (OE). These parts may be made by the car factory or by an independent supplier for the factory. Parts produced by quality independent firms will equal or better those made by the factory. If, for example, your car has a Delco-Remy ignition system, you can use replacement components made by companies such as: Echlin, Sorensen, Niehoff and others. These brands offer factory quality at slightly lower prices.

Some independently produced replacement parts may even be superior to the factory-made item. Replacing OE nongreaseable ball joints with a set that can be greased can increase ball-joint service life. Heavy-duty or upgraded replacement parts may cost more, but they'll give you greater reliability.

Clever packaging ploy could fool even an experienced mechanic. In the box at left is the real Fram filter; the other box is a facsimile containing a filter that could ruin your engine.

When you replace parts such as alternators, clutches, air-conditioner compressors, starter motors, water pumps and other components, consider a rebuilt unit. A rebuilt part uses the housing or "core" from a worn-out part that is fitted with new internal components where necessary. Rebuilts can perform as well as, or better than, new parts while costing up to 60 percent less. You usually have to turn in your old part as a core exchange or pay an extra charge.

The term "remanufactured" is often used interchangeably with the term "rebuilt." While today they have come to have the same meaning, there are two distinct rebuilding techniques. Smaller shops generally have one person overhauling an entire unit, testing and replacing bad components. Larger facilities are set up in assembly-line fashion. The parts move along through various work stations in a remanufacturing process that resembles production of a new part.

Some remanufactured or rebuilt parts may be better than new. In dealing with large numbers of worn-out units, the rebuilder can determine why they wore

(Please turn to page 138)

BUYING AUTO PARTS

(Continued from page 137)

out in their original use. If the cause is a bad design or substandard components, the rebuilder can make design changes or use stronger components.

While mejor remanufecturers often have more extensive testing and quality-control procedures than smaller shops, size alone does not determine the quality of work. Both types of operetions can turn out a good product. Aside from independent perts rebuilders, OE companies such as Delco also offer a rebuilt line.

Rebuilt parts ere clearly labeled es such. Look for a strong warrenty as a sign of quality. Companies such as Arrow Automotive Industries, Champion Parts Rebuilders, emong others are established leaders in this field.

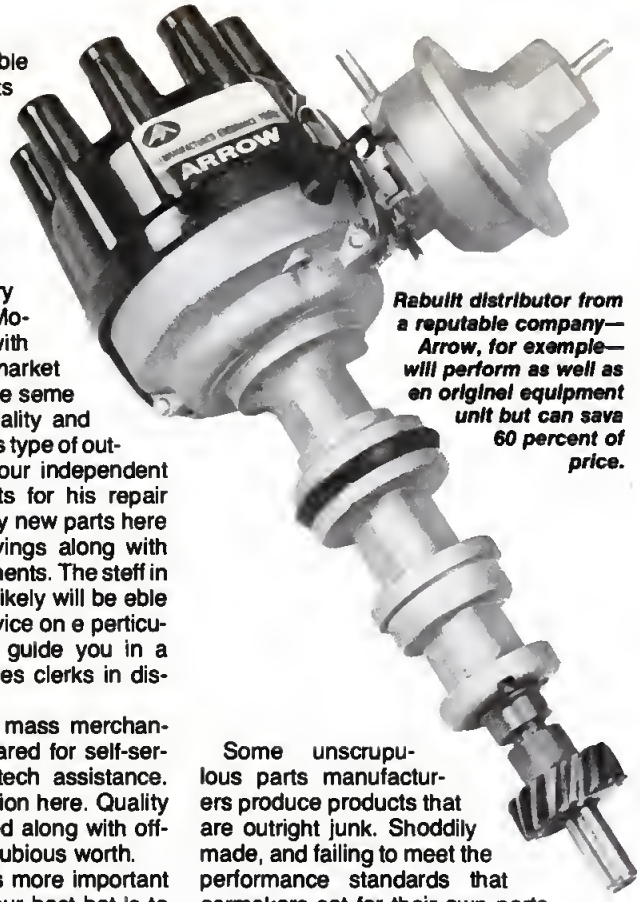
Used parts, sometimes called recycled perts, are taken off junked or wrecked vehicles, cleaned up or sold as is. This route offers substantiel sevings on big items such as body perts, rediators, rear-end assemblies and even complete engines. Warrenties in this eree ere practically nonexistent, and unless you are looking at perts thet don't wear out, such as en intake manifold, buying used is something like playing a crap game. Even If you have to freshen up a used part, such as installing new rubber bushings on a suspension component, you may still come out far eheed on price. Careful inspection is the name of the game here. A part that may be okay on a wrecked car cen be demeged by sloppy removal.

Auto parts are available et eny number of outlets ranging from new-car dealers to junkyards. Car dealers offer genuine factory parts, but cherge top dollar.

Auto parts stores (wholesale/retail) also carry some factory brands, such as Delco, Motorcraft, Moper, elong with parts made by aftermarket firms. They mey stock the seme application part in a quality and "budget" priced line. This type of outlet basically is where your independent mechanic gets the parts for his repair jobs. You can buy quality new parts here at modest discount savings along with top-grade rebuilt components. The steff in this type of outlet more likely will be eble to give you technical edvice on e perticular repair problem end guide you in a choice of perts than sales clerks in discount stores.

Discount outlets and mass merchandiser operetions ere geared for self-service and offer limited tech assistance. Price is a big consideration here. Quality products may be stocked along with off-brand merchandise of dubious worth.

What parts you buy is more important than where you buy. Your best bet is to stick with established and familiar brands. A knowledgeable, reputable parts outlet cen guide you in this area, but there's a little known pitfall that awaits even the brand-conscious parts buyer.



Rebuilt distributor from a reputable company—Arrow, for exemple—will perform as well as en originel equipment unit but can save 60 percent of price.

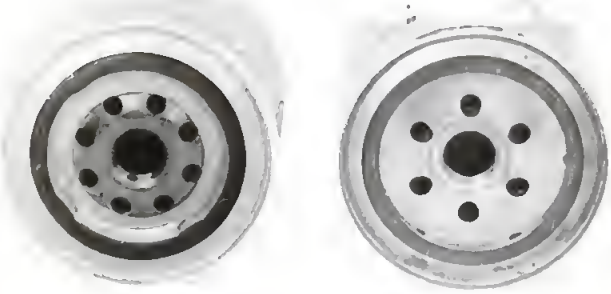
Some unscrupulous parts manufacturers produce products that are outright junk. Shoddily made, and failing to meet the performance standards that carmakers set for their own parts, these "gypsy parts" operators, as they're known, have come up with e gimmick to sell their stuff to consumers who normally wouldn't touch their products with e 10-foot pole. Whet these shysters do is counterfeit packaging of their products so you think you're buying e genuine fectory pert or name-brand item.

Big name-brand companies have considerable research and development fecilities to improve their products continually and bring out better ones.

We got a sample of this kind of R&D on a recent trip to Fram, the filter people, in Rhode Island. Their head research engineer, Tony Caronia, showed us how they take rendom semplings of oil filters off the assembly line end bring them into the leb for tests. The filters ere subjected to a veriety of tests including a hot, high-pressure test to 600 pounds per square inch (p.s.i.). The highest pressure an oil filter will ever see in its service life is around 60 p.s.i. For comparison, they tested en off-brand filter under the seme conditions; not only did it blow its gasket at 100 p.s.i. but the casing also feiled end began losing oil at 200 p.s.i.

Reputable companies also carry product liability insurance. If your engine blows up because a name-brand oil filter proved defective, the oil filter company, through its insurance coverege, would pay for the damages.

If some reteiler wents to sell you look-alike parts, just ask him if it makes any difference to him if you pay in look-alike money. PM



The real Volvo filter is at far left. It has more drein holes end e pressure relief velve. The one et left is e counterfeit sold in a box made to resemble the Volvo box. Below, the real thing is at left, the fake is on the right.

How Havoline Supreme can help you get the most out of your car.

Proven protection up front.

Backed by improved mileage.

Whether you change your own oil or someone else does, there are some important things you should know about Havoline Supreme.

First of all, Havoline Supreme has a Texaco-developed, balanced additive system with a built-in, special friction fighter.

And its multigrade rating offers the convenience of all-year-round, wide-temperature range protection.

Havoline gives you proven protection.

The final test of a motor oil comes under actual driving conditions. Havoline Supreme has proven it delivers the kind of protection needed in tough, high-speed state trooper cars and severe stop-and-go driving in New York City taxis.

Havoline helps save gasoline.

Fuel economy tests proved it. Compared to a conventional motor oil, Havoline

Supreme, with its special friction-fighting additive, helps save gasoline.

Havoline is diesel tested.

If you own a diesel, we have good news. Havoline 10W-30 has the API-SF/CC rating required by most engines like yours. And it's been proven in punishing diesel-powered taxis.

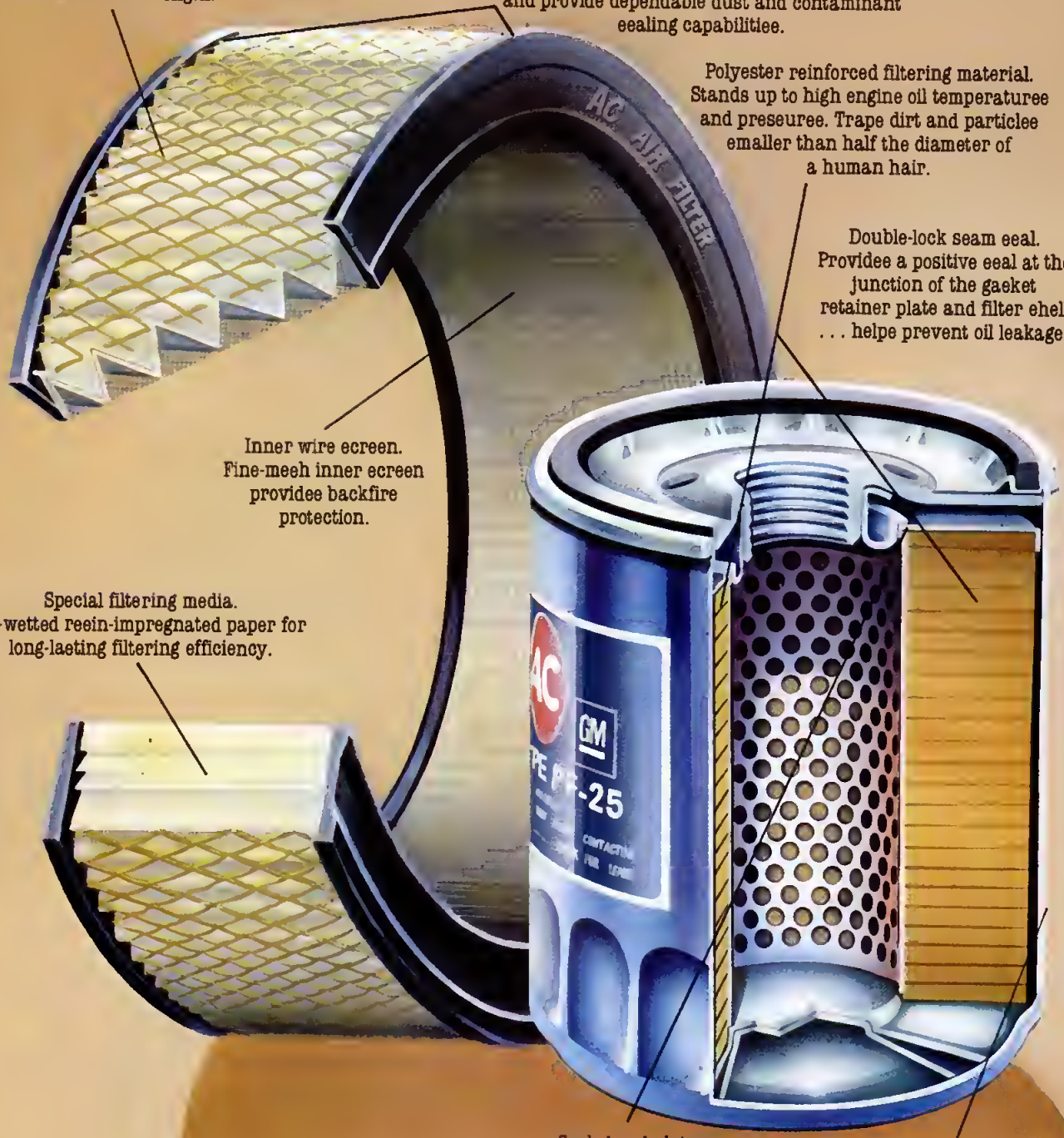
Listen to an expert.

Top Indy 500 driver Tom Sneva calls Havoline Supreme a "very sophisticated oil...one that a prudent car owner should use on a regular schedule." Shouldn't you?

TEXACO

You can trust your car to the products with the Star.

Now you can get great engine



protection with style and art.

You can count on AC Filters for reliable sngine protection. But if you buy one now, you can count on soms othsr great things, too.

Let'e etart with the AC Filters. Because chancss are your car did when it was new. AC Filtsrs protsct more new U.S.-built cars and trucke than any other brand. AC Filtere are deeigned to etand up to the high preeeuree and temperatures of today'e enginss.

Go with AC for thoueande of milee of worry-free driving.

Look good wherever you go.

With the coupon below and AC-Delco proof of purchase, you'll get a great deal on the hot new look in "performancs" jackete. With slesk Europsan styling, sys-catching accents and knit trim. Your ohoics of blus or silvsr, in sizss for both msn and women. They're lined too.

And to kssp you looking great, the fabric is both long-wearing and machine washable.

Each jackst comee with the AC-Dslco eignature embroidered over the left pocket. And for no extra chargs, you can add ths emblem of your favorite GM car. You'll wear it with pride.

And take your favorite cars inside.

Four Ken Dallieon prints can also be yours — at a rsmarkable price. The renownsd automotivs artist was commieeioned to give his especial treatmsnt to two of the hottest cars on the streete today. And two of the moet popular performance cars of the paet.

Deeigned to become claeeice themeelvss, the works of ths renowned artist capturs ths bsauty and powsr of ths '82 Camaro, the '82 Firsbird, the '70 Hurst Olds 442-W-30, and the '69 Pontiac GTO "Judge."

Theee full-color printe measurs 14" by 11", are euitable for framing and coms in a handsoms portfolio. All four — including ths portfolio — ars yours for just $5.00.

Plus a free fuse kit.

Order ths jackst and/or ths sst of four printe and we'll eweeten the pot with a free fuee kit. A $3.91 value. All you have to do is specify your typs of car.

Don't mise out on theee great offers. And don't go without ths protection of AC Filters. Get youre today.

And rsmember — to keep your car running right, go with AC-Delco.

Proof of purchase of any AC-Delco product qualifies you for this offer.

Order today for faet eervice.
Include proof of purchase of any AC-Delco itsm.
Name _____
Addreee _____
City _____
State _____ Zip _____
( ) Fuse kit — youre at no charge whsn you order any itsm at right.
Indicats type: ( ) American-built, 1976 and before
( ) American-built, 1977 and after
( ) European
( ) Japansse

RACE-STYLED PERFORMANCE JACKETS

Jacket Sizee	XXS	XS	S	M	L	XL	XXL
Women'e Dress Size	6-8	10-12	14-16	18-20	—	—	—
Men'e Suit Size	—	30-32	34-36	38-40	42-44	46-48	50-52

Embleme: Firebird, Camaro, Corvette, Chevrolet, Oldsmobile, Pontiac, Buick, Cadillac, GMC, Chevrolet Truck, None

PM-10

JACKETS:

Blus or Silvsr	Emblsm	Size	Price Each	Quantity	Total
			$29.95		
			$29.95		
			$29.95		

KEN DALLISON CAR PRINTS — Set of 4 — $5.00 per eet _____
Subtotal _____
4% Michigan Sales Tax (Michigan Reeidente Only) _____
Grand Total (Price includes shipping charges) _____
( ) Charge it. Pleaee charge to my credit card, account no.: ☐☐☐ ☐☐☐☐☐☐ ☐☐ ☐☐☐☐
( ) BankAmericard/VISA ( ) MaetsrCard™

Signature _____
Exp. Date _____
Offsr good through 3-31-83 or while supplies laet.
Void where prohibited by law. Offsr valid in U.S.A. only.
Allow 4 to 6 weeks for delivery.
Send check or monsy ordsr to:
MICHIGAN MAILERS, 222 South Elm, Owoseo, MI 48867.

AC-Delco is the way to go.

AC Delco
GENERAL MOTORS CORPORATION

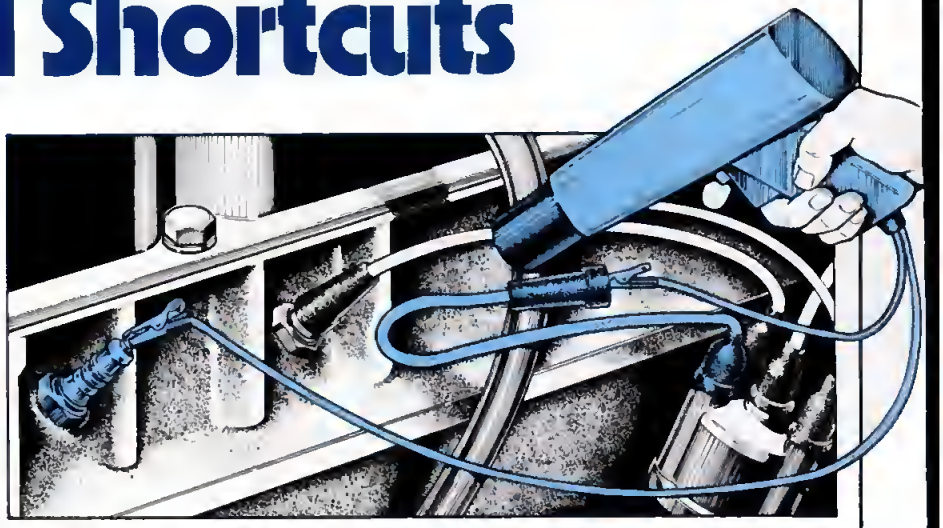
Service Secrets And Shortcuts

1 Ignition-wire check

If your engine misses whila idling, or runs poorly, end you suspect the problem is being caused by e bed ignition (sparkplug) wire, here's an easy wey to check your wires. First you'll heve to get en inaxpensive timing lights that usas just two leeds. This type of light doesn't heve leeds that attach to tha battary.

Ramova ona sperkplug wire et e time. Connect ona timing light laad to tha plug wire and the othar laad to the sperkplug. Than stert the engine. If the wira is in good shepe, the timing light will flash brightly each tima the plug firas. If tha flash is dim, there is e problem in tha wira.

If thara is a quastion es to whether tha wire or the sparkplug is at fault, remova the plug and instell ona thet you know to be good. Then you can repeet tha tast.



To check the condition of sparkplug wires, connect e two-lead timing light between the sperkplug end the wire. A bright flesh when the plug fires means the wire is okey.

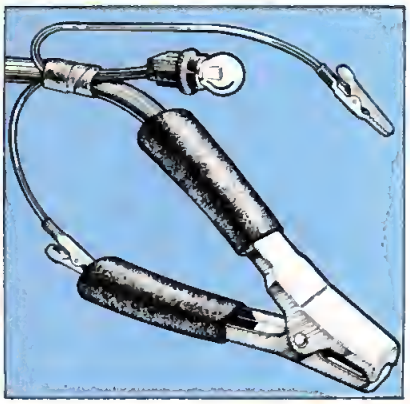
2 Booster safety light

Improper connecting of booster cablas cen be expensive and dengarous. You can seriously damage an altemator, and worsa, you can ceusa a battery to exploda, causing harm to yourself. Protection is simpla and chaep with a safaty light you cen rig up yourself. Take any 12-volt, single-contact socket and connect the hot leed to the positiva-cable metel clamp. You can aither drill a hola in the clamp end ettach tha laad with e shaat-matal screw, or ettech an alligator clip to tha laad wire and connect it to tha bettery clamp. Pull down the plastic grip on tha free sida of the battary clamp, run tha wira through the grip, clemp tha matel hendla end slide the grip back into position. Also ettech an alligetor clip to the other wira leed.

Tapa pert of your tast-light wira to the boostar cabla to pravant tha wire from gatting fouled.

Before hooking up the booster ceble, ba sura to idantify the positive bettery terminel. Connect the alligator clip on tha fraa end of the tast light to any suitabla ground. Now touch the positive boostar cabla to the bettary terminals. The terminel thet lights up your test light is the positiva one.

We'ra meking tha essumption, of coursa, that your vahicla isn't e real oldia, es some early alectrical systams used e positive ground.

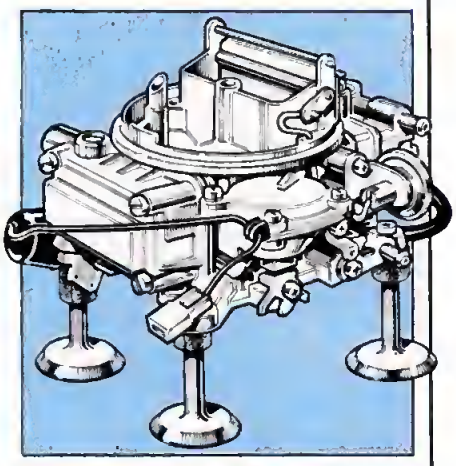


Do-it-yourself safety light helps prevent improper connection of booster cables.

3 Carburetor workstand

If you'va avar placed e cerburetor on a flet-surfaced workbench, you know how clumsy and ewkward it is. The linkages end othar attachments extending down from the carb body make it unsteble and unwieldy to work on. This problem is

(Please turn to page 144)



Old engine velves end tepe combine to meke en inexpensive carburetor stend.

SMOKERS

U.S. GOV'T LATEST REPORT:

King, Menthol or Box 100's:

A whole carton of Carlton has less tar than a single pack of...

...KINGS	TAR mg./cig.	NICOTINE mg./cig.
Kent	12	1.0
Winston Lights	11	0.9
Marlboro	16	1.0
Salem	14	1.1
Kool Milds	11	0.9
Newport	16	1.2

...100's	TAR mg./cig.	NICOTINE mg./cig.
Kent 100's	14	1.2
Winston Lights 100's	12	0.9
Benson & Hedges 100's	16	1.1
Parliament Lights 100's	12	0.9
Salem 100's	15	1.1
Marlboro 100's	16	1.1

TAR & NICOTINE NUMBERS AS REPORTED IN LATEST FTC REPORT

Carlton Kings	**Less than 0.5**	**0.1**
Carlton Menthol	**Less than 0.5**	**0.1**
Carlton Box 100's	**Less than 0.5**	**0.1**

Box—lowest of all brands—less than 0.01 mg. tar, 0.002 mg. nicotine.

Carlton is lowest.

U.S. Government laboratory tests confirm no cigarette lower in tar than Carlton.

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

Box: Less than 0.5 mg. "tar", 0.05 mg. nicotine; Soft Pack, Menthol and 100's Box: Less than 0.5 mg. "tar", 0.1 mg. nicotine av. per cigarette, FTC Report Dec. '81.

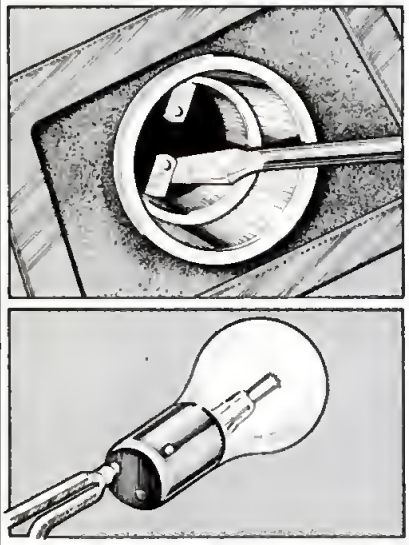
easily eliminated with a simple carburetor stand you can make yourself. Just take four old engine valves and wrap some tape around the stems about two inches down from the top of the valve stems.

Place the carburetor mounting holes over the valve stems and ease the carburetor down the stems until it rests against the tape. If the valve stems are too thick for the carb mounting holes, grind the stems down until they fit. The valves will give you a good stable workstand and elevate the carb a couple of inches off the bench.

4 Better bulb contact

Temperamental taillights and parking lights that flicker or go out because of poor connection between the bulb and socket contacts can be remedied without having to buy new bulbs or socket assemblies.

An excellent way to revive weakened

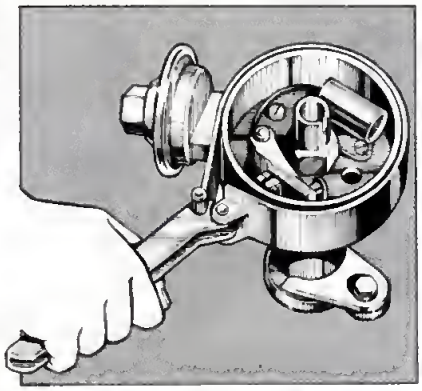


Flickering parking lights and taillights may be caused by poor bulb contact. An inexpensive fix is to pry up weakened contact springs in the socket with a small screwdriver. Flattened bulb contacts can be built up with a small drop of solder.

contact springs is to pry them up with a small screwdriver. Make sure the vehicle lights are off to avoid shorting out the circuit. Flattened bulb contacts can be restored by applying a bit of solder to them. If you add too much solder, file down the excess.

5 Distributor handle

When checking and adjusting your engine's ignition timing, you may find you're unable to budge the distributor after you've loosened the hold-down bolt to advance or retard the timing. In



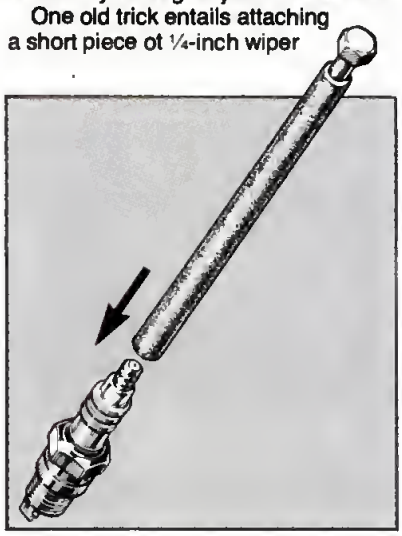
Oil-filter wrench will give you extra leverage needed to free a stuck distributor.

this case, you can get the extra leverage you'll need to free the distributor by removing the cap and gripping the distributor body with an oil-filter wrench.

6 Sparkplug tool

Tuning up a V8 engine is not significantly different from tuning up a Four or Six—except for one thing. Sometimes the sparkplugs are hidden so far out of the way that you need a hand with universal joints in your knuckles and extensions on your fingers just to install them.

One old trick entails attaching a short piece of ¼-inch wiper



Installing sparkplugs in some V8s is easier with this bolt-stiffened hose tool.

hose over the end of the plug so you can get it started in the cylinder head.

This measure doesn't work all the time because, in some instances, the hose is too flexible and it won't turn the plug. What you need in those cases is a super trick. Take a two- or three-inch section of ¼-inch wiper hose and insert a ¼-inch bolt that's a little shorter than the hose. The bolt will give the hose the increased rigidity needed for easy sparkplug installation.

7 Timing marks

Timing your engine is much easier if you can see the timing marks and pointer clearly. Unfortunately, most engines are dirty and grimy, a condition which tends to obscure the timing marks. Painting a set of permanent timing marks will ease the timing process considerably.

First, clean the pulley or wherever the timing marks are located on your engine. An engine degreaser will work best here. Then use white enamel nail polish to paint over the timing pointer and the timing mark that your engine should be adjusted to at idle. The enamel nail polish will shrug off grease and

Timing marks painted with white enamel nail polish will be much easier to see.

water, and is especially visible for accurate timing.

Some timing scales don't extend far enough for you to check mechanical and vacuum advance accurately. Painting additional marks will help you to check engine advance at specified rpm.

(Please turn to page 146)

AUTOMOTIVE SILICONES

GO THE DISTANCE

m The Track And On The Street, GE Silicones ead The Field In Proven ong Life And Dependability.

With the GE Family of Automotive Silicones, ou get exceptional durability for resistance o road shock, vibration, weather nd temperature extremes.

- ExSil Spray & Lube
- Auto Seal (black, clear)
- Windshield & Glass Seal (clear)
- HI-TEMP Auto Gasket (red)

Plus to help get you on the road o dependable driving, use the coupon elow. You'll receive valuable refunds m GE Automotive Silicone products.

For lasting auto maintenance and repair, ely on the sealants and gaskets, trusted by rofessionals and do-it-yourselfers alike— E Silicones.

WE BRING GOOD THINGS TO LIFE.

GENERAL ELECTRIC

$1.00 to $9.00 Back From GE Silicones

Silicones **How To Get Your Refund(s):** Fill in all blanks below. Include all proof of purchase items and mail with this coupon to **GE Silicone Fall Rebates, P.O. Box 2007, Berlin, CT 06036**

REQUIRED PROOF OF PURCHASE For each item purchased on which a refund is requested submit (1) Cash register tape with store name, price(s) paid circled and (2) Cut GE Monogram from back of each cartridge and/or clip 2" off each blister card for each item you claim a refund on.

★ $1.00 REFUND ON HOUSEHOLD OR AUTOMOTIVE PRODUCTS

QUANTITY

01 _____ of 8.5 fl. oz. or 10.3 fl. oz. Cartridges at $1.00 each — $_____

02 _____ of 1.0 fl. oz. Tubes at $1.00 each — $_____

★ $1.50 REFUND ON HOUSEHOLD OR AUTOMOTIVE PRODUCTS

QUANTITY

03 _____ of 2.8 fl. oz. Household Tubes at $1.50 each — $_____

04 _____ of 1.9 fl. oz. or 2.8 fl. oz. Automotive Tubes at $1.50 each — $_____

LIMIT 6 PRODUCTS PER FAMILY/ADDRESS

Total Refund Request $_____

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

This refund offer is limited to no more than 6 GE Silicone consumer products per family/address. Offer good only in U.S.A. and Puerto Rico. Offer void where prohibited, taxed or restricted by law. Wholesalers, distributors, retailers and commercial accounts are not eligible for refunds. Allow 6-8 weeks for refund. This coupon and required proof of purchase must accompany your request. Duplicates, facsimiles or copies will not be honored. Offer expires **12/31/82. NOT TRANSFERABLE**

EASY DOES IT!
WITH VHT®

FLAMEPROOF COATING
The #1 coating for headers, pistons, stoves, boilers and numerous other applications. Reduces engine compartment temperatures. Available in 16 colors that beat the heat. Often copied—never equalled.

ENGINE ENAMEL
Heat resistant urethane formulation withstands engine temperature while providing a durable coating resistant to gasoline spillovers. Available in 14 Gloss and Flat finishes.

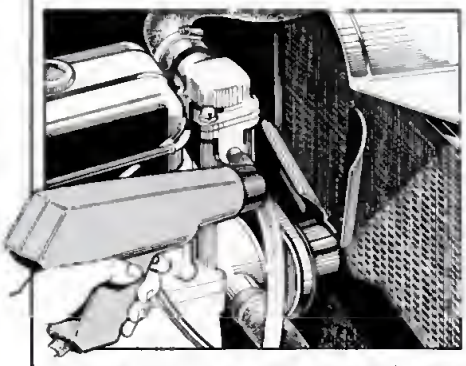
SPEREX CORPORATION
16131 SD. MAPLE AVE. GARDENA, CA. 90248
213/323-6162 • TELEX 194567

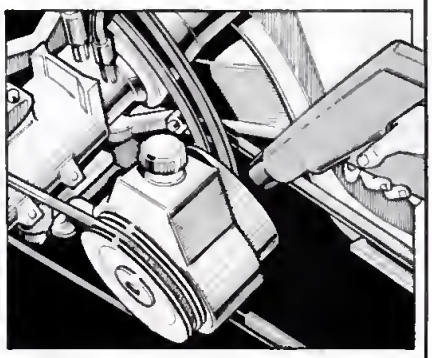
CAR CARE GUIDE 25 TIPS FROM THE PROS

8 Belt slippage check

Drive belts that slip are inefficient and wear out prematurely. Slipping belts don't always squeal to let you know they're slipping.

If you want to check the alternator fan belt for slippage, hook up e timing light as you would to check ignition timing. Turn on electrical accessories and lights to put a load on the elternetor. Aim the timing light at the fan blades. If the bledes don't appear to be standing still, the elternetor belt is slipping. Use the seme basic procedure to check the other belts. To check the power steering belt, use a chalk or tape reference mark on the pump body and pulley. Aim the light at the pump while someone turns the steering wheel from lock to lock to put a load on the pump. If your reference marks don't stay in the same reletive position, it's a safe bet that your belt is slipping.

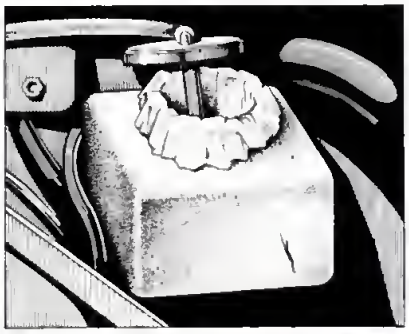




Slipping drive belts can be detected by means of a timing light aimed at the fan blades (left) or at reference marks made on accessory drive pulleys and housings (right).

9 Washer reservoir repair

Water in your windshield washer reservoir can cause problems in winter. It'll freeze end creck the reservoir, ceusing it to leak. If yours is elready cracked, an inexpensive fix is to take a strong plastic bag—the kind that's used for food storege—and stuff it into the washer reservoir.

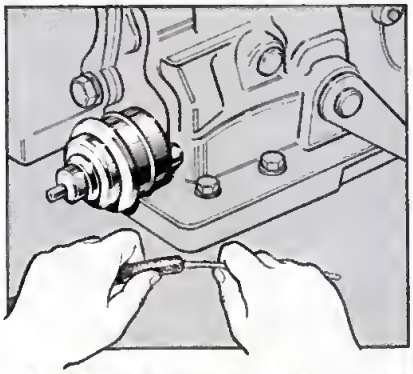


Fix leaking windshield-washer reservoir by inserting a plastic bag inside container.

Open the bag es much as possible inside the reservoir and fold the open end over the reservoir opening. Fill the bag with washer fluid and snap the lid onto the reservoir over the bag. This trick could also save a good reservoir if you forget to edd entifreeze fluid next winter: When the plain water freezes, the plestic bag will expand and prevent damage to the reservoir.

10 Modulator check

You know that sinking feeling when your automatic transmission starts acting up by shifting roughly. While transmission work generelly results in big repair bills, there's a relatively simple check end repair you can do yourself. Automatic transmissions use a vacuum modulator unit to maintain proper shifting opera-



Transmission fluid in the modulator vacuum hose is a sign of a bad modulator.

tion. Occasionally, the internal diaphragm in this unit fails and causes rough shifting. To check, locate the vacuum hose running from the carburetor to the modulator. A bad hose will cause vacuum leaks that can also be the source of transmission shifting problems.

If the hose checks out okay, disconnect it at the modulator and check for evidence of transmission fluid. You can do this by inserting a pipe cleaner or a Q-tip as far as possible into the vacuum hose. Also check for transmission fluid in the modulator vacuum hose connection pipe.

If you find telltale evidence of transmission fluid, it means the diaphragm is blown and the modulator is bad. You can replace the unit yourself at minimal cost and effort. Or you can have your local mechanic replace it.

11 Timing-light extension

Some engines have timing marks in such an out-of-the-way location that you practically have to stick your timing light into the fan in order to draw a bead on them. After having one expensive timing light grabbed out of our hands and chewed up by the fan, we came up with this safety tip. Take a section of old radiator hose, place it over the end of the

Timing-light extension made from a radiator hose or inner tube is a safety feature when working close to fan blades.

timing light and hold it in place with a hose clamp. If a piece of hose isn't handy, you can do the same thing by rolling a section of old inner tube into a tube shape and slipping it onto the timing light.

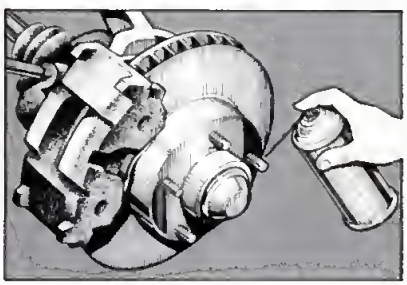
The flexible rubber extension will give you an additional measure of safety should the tip accidentally strike the fan blades.

The extended tip also narrows the light beam and concentrates it, providing greater visibility of the marks for better timing accuracy.

12 Lug-nut removal

Many cars today with sporty styled wheels do not use hubcaps to cover the lug nuts. Exposed to water, road salt and other corrosives, the lug nuts tend to stick to the wheel lugs after a period of time, making removal rather unpleasant.

A penetrating oil will sometimes help



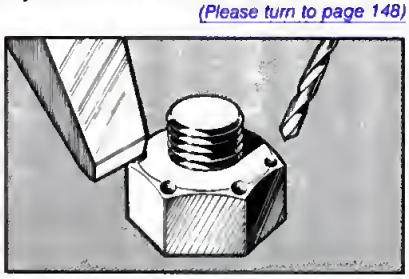
Spraying wheel lugs with antiseize compound will make lug-nut removal easier.

loosen stubborn lug nuts, but in this case some preventive maintenance will go a long way. Remove the lug nuts (while they're still easy to remove) and spray the wheel lugs with antiseize compound (available at parts outlets and hardware stores). Then replace the lug nuts. In the event you have to remove a wheel later on, you'll be able to keep your cool while everyone else is jumping up and down on their lug wrenches.

13 Nut cracker

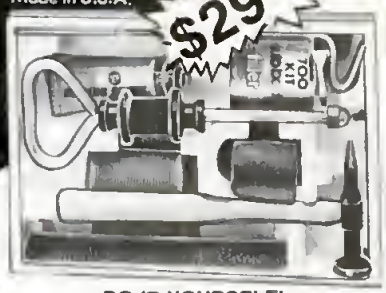
Large nuts that are frozen to bolts present real problems in removal. When the nuts are too large for a nut-splitter, or if you don't have one of these tools avail-

(Please turn to page 148)



To remove large frozen nuts, drill corners and then split, using a hammer and chisel.

fix rust spots dents and holes yourself with the auto body repair kit
Made in U.S.A.
Only $29.95



DO IT YOURSELF!
With this kit an amateur can accomplish amazing results
KIT CONTAINS:
Body Hammer • Dent Puller • Body Dolly
Metal File • Fender Flange • 6-Sandpaper
Fiberglas Screen • Glazing Putty • Cream
Hardener • Body Plastic with Applicator
INSTRUCTION BOOK
Fully illustrated Instruction book has been designed to show in pictures the simple easy-to-do steps necessary to auto body repair.
Send $29.95 Plus $3.95 shipping, handling & insurance (IL Residents Add Sales Tax)
VISA and Master Card accepted
Satisfaction Guaranteed
Make check or money order payable to:
SANIN INTERNATIONAL, INC.
29 E. Madison St. Dept. A3 Chicago, IL 60602

PermaTorque/Blue®
And Printoseal®

...The Head Gaskets That Never Need Retorquing!

PermaTorque / Blue

The Teflon flows cold under torquing pressure as the soft fiber face seals even where minor surface irregularities occur. Designed for domestic and import engines.

PRINTOSEAL

For engines with critical sealing needs, PRINTOSEAL gaskets have a high temperature rubber bead for an extra anti-leak barrier.

Do the job right, do it once, and do it fast — buy where FEL-PRO sealing products are sold.

*PRINTOSEAL process under license from Dowty Seals, Ltd Great Britain U S Patent No 3477867
** Teflon is a registered trademark of the DuPont Company

FEL-PRO®

FREE! The complete No-Retorque Head Gasket story from the #1 gasket manufacturer.

Mail To: Fel-Pro Incorporated
7450 N McCormick Blvd
Box C 1103 Dept. PM-1082
Skokie, Illinois 60076

Name _____
Address _____
City _____
State _____ Zip _____

CAR CARE GUIDE 25 TIPS FROM THE PROS

able, you have to resort to the old chisel and hammer routine. This is a tedious operation at best.

A shortcut that usually works is to drill holes in the corners of the nut and then go at the nut with chisel and hammer. The nut will peel away much faster when the corners are drilled. Before you start drilling, make pilot marks with a punch so the drill won't slip. If the nut and bolt start moving around during the operation, have someone hold the nut with a pair of locking pliers. Remember to use safety glasses when you're doing this job.

14 Air-filter check

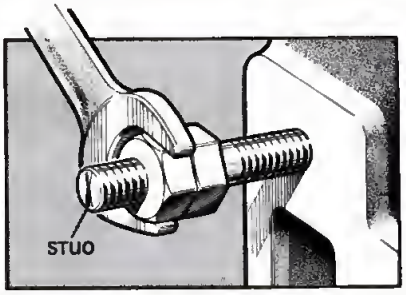
It's difficult to tell just how dirty an air filter really is by looking at its outside surface. You'll get a more accurate picture of the filter's state of health if you remove it from the air-cleaner housing and place it over your droplight. If you can see light through the filter element,

If the light from your droplight doesn't penetrate air filter, change the element.

you can reinstall the filter after tapping the element to shake loose some of the surface dust that has managed to accumulate. If light is not able to penetrate the filter, however, it's too clogged with collected dust, dirt and grime to be salvaged. In this case, you have no alternative but to replace it.

15 Stud removal

How do you go about removing a stud without damaging the threads? Very simple, really. Screw two nuts partway down the stud and then tighten them against each other. Now, turn the bottom nut counterclockwise to remove the stud.



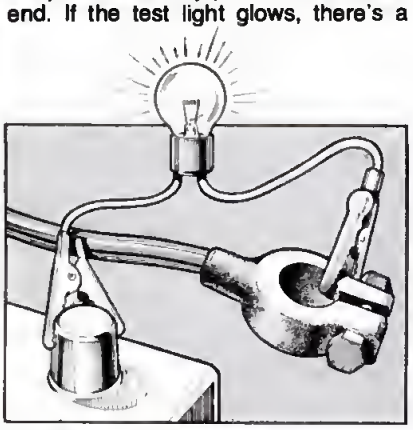
Remove studs by screwing two nuts against each other, tightening them, and then turning the bottom unit.

The same method works equally well for installing studs. In that case, however, you turn the top nut in a clockwise direction.

16 Testing for current drain

If your battery has a nasty habit of running down or going dead, the problem may be in the battery itself or a short somewhere in your wiring system. To check for shorts, disconnect the positive battery cable. Then disconnect any accessories, such as the clock, that runs continuously. Also make sure your dome light is switched off.

Connect a 12-volt test light between the positive battery post and the cable end. If the test light glows, there's a



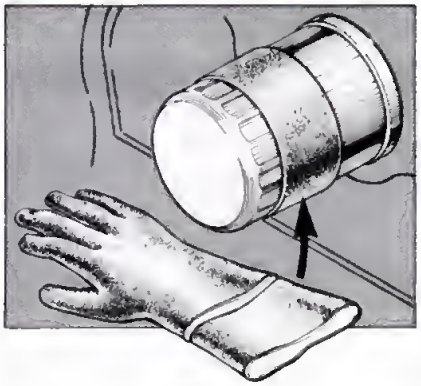
A test light hooked between positive terminal and cable detects battery drain.

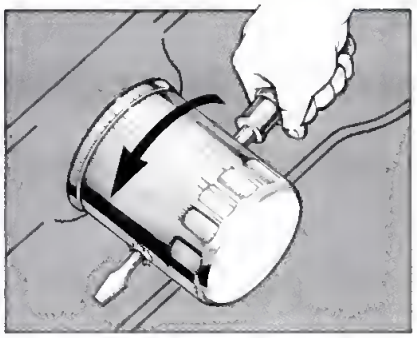
short somewhere in your wiring system. A faint glow indicates minor current drew, while a strong glow means a more serious short.

No glow at all means you do not have a short, but you might have a totally dead battery. To be absolutely sure, you should charge the battery. If the light still doesn't shine, then you don't have a short and the battery is simply worn out and should be replaced.

CAR CARE GUIDE

25 TIPS FROM THE PROS





Strip of rubber glove (left) gives oil-filter wrench better grip. Spearing filter with screwdriver (right) is a last resort when the rubber-glove trick fails.

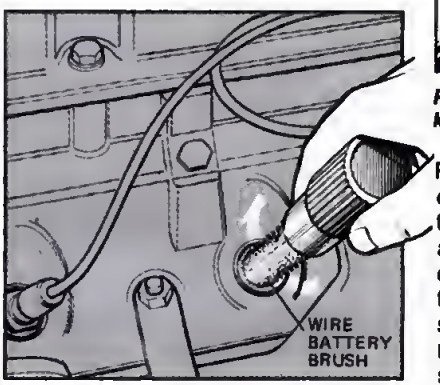
17 Oil-filter removal

If your oil-filter wrench slips on e stubborn oil filter, there's an easy way to improve its grip. Cut a 2-to-3-inch band from the end of an old rubber glove. The kind that's used for washing dishes or household chores works just fine. Slip the band over the oil filter and try your wrench again. This should work on all but the most difficult filters.

For filters that are attached to your engine in a deeth grip, more drastic ection is necessary. Punch e long screwdriver completely through the lower portion of the filter. Make sure you heve a pan handy to catch the oil that squirts out of the filter. Use the leverage provided by the screwdriver to free the filter. You can finish the job by unscrewing the filter by hand or with a filter wrench.

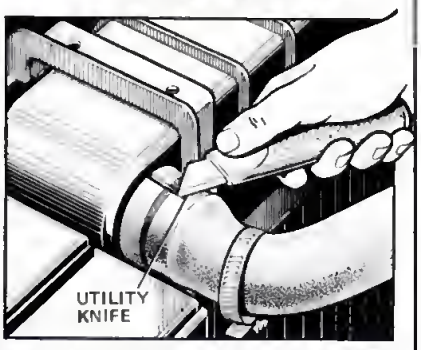
18 Sparkplug-hole threads

Sparkplug-hole threads can get gummed and caked up by combustion gases and blowby that can work their way past improperly tightened sparkplugs. Dirt and grit cen elso fell into the threeds when sparkplugs are removed. This condition not only mekes sparkplug replacement more difficult, it can cause cross-threading in the case of aluminum heads. You can buy a speciel tool, called e thread chaser, to clean up the threads, but a less expensive method is to use a battery cable end brush. Work the metel brush around thoroughly in the sparkplug holes to clean up the dirty threads.



Battery cable end brush does a good job of cleaning threads in sparkplug holes.

19 Hose removal



Remove stubborn hose by slicing with a knife and peeling hose away from fitting.

Radiator and heater hoses have a way of eventually bonding themselves to their metal fittings, making replacement a chore. One thing to avoid, after loosening the hose clamp, is yanking and twisting the hose. Radiator fittings are soldered and can be broken off with rough treatment. Remove the hose by slicing it with a knife. Work the knife between hose end fitting to peel the hose off. (Please turn to page 150)

You'll never drive a dirty car again!

Now You Can Keep your car so gleaming clean—all the time, rain or shine—that neighbors will ask how you do it!

New The secret is this **NEW WAY** to use KozaK*—the specially treated, thick, soft, deep-nap cloth that has been keeping fine cars showroom-clean and shiny for proud owners, for 56 years.

Now, with this remarkable KozaK Drywash* Cloth, you can also have KozaK's **NEW SUPER HELPER***, used like a chamois. It brings glowing beauty back to your car, even if the weather is bad and your car dripping wet.

We Wash Your Car By Mail

Thousands of delighted car owners call KozaK "the car wash that comes by mail". In just minutes on a nice day, a few easy swipes with the time-tested KozaK Auto Drywash* Cloth (good for at least 50 times) gently cleans your car of dust and grime—no hose, no pail, nothing to cause rust, squeaks, chapped hands or wet feet.

It's so gentle, so thorough, so safe, thousands of careful car owners entrust the precious finish of even Rolls Royces, Cadillacs, Continentals and other costly cars to KozaK care—and have for years.

Then, on wet days, the new Kozak's Super Helper—just as quick and easy to use—wipes off your car in only minutes. Paint dries to a gleaming shine in seconds. Glass and chrome really sparkle!

If Not Delighted After 30 Days Use—Your Money Back, You Keep the Cloths!

That's our out-and-out Guarantee. Can you imagine us being able to afford it, if many users wanted refunds? They don't because KozaKs do exactly what we say. And this new way, with the KozaK's Super Helper, works even better than ever before.

Check coupon below: get Super KozaK for dry car, Super Helper for wet car—or both, at $2.50 saving, for all-weather car protection and beauty. If, after 30 days use, either or both don't do every last thing we promise—simply tell us, you keep the order, we'll refund every cent to you. Could anything be more fair?

Never drive a dirty car again. Let KozaK keep your car clean, proud looking; protect its finish, prolong its beauty, boost its trade-in value. To let $11.95 save you at least $100 in ordinary car washes, mail coupon below with your remittance NOW to . . . *®

KozaK, 775 S. Lyon Street,
Batavia, N. Y. 14020
Established — 1926

On your 30 day no-return but full-refund Guarantee, please send me at once:

☐ Super KozaK (For Dry Car) $7.95 Postpaid
☐ Super Helper (For Wet Car) $6.50 Postpaid
☐ **BOTH for only $11.95, Postpaid**

☐ Payment Enclosed ☐ Master Card ☐ Visa

Card No. .....

Exp. Date .....

Print Name .....

Street .....

City ..... State ..... Zip .....

Lady KozaK—(for furniture only) ☐$3.75

SOcketMaster
Division of Consolidated Product & Research Inc

SOCKET ORGANIZER FOR 10 TO 69 SOCKETS

- Eliminates Socket Loss
  - Springs hold sockets secure
  - Organizes 69 sockets
  - Markings provide for consistant storage
- Stores In Any Position
  - Hangs on pegboard
  - Fits in tool box drawer
  - Stores on workbench
- Completely Portable
  - Eliminate guess-work
  - Fingertip convenience
  - Time saver
- Professional Craftsmanship
  - All steel base
  - A.S.S. steel springs
  - Baked-on enamel finish

(SOCKETS NOT INCLUDED)
Pat. pending

Money Back Guarantee

Created for professional workmen, mechanics and do-it-yourselfers, SOCKETMASTER makes it simple to organize, store, locate and transport a full compliment of sockets. With the high price of tools today, SocketMaster can pay for itself by eliminating the loss of just a few sockets. It takes the guesswork out of choosing the right socket for each job. And it replaces aggravation with working ease by keeping sockets in their place at all times.

enclose check or money order Visa or Master Charge

YES—I WOULD LIKE SOCKETMASTER, PORTABLE SOCKET TRAY(S) AT $19.95 EACH
(Add $2.00 per order for handling and insured delivery)

NAME
ADDRESS
CITY STATE
ZIP

Mail To SOCKETMASTER, P.O. Box 3022, Oak Park, Il. 60303
Please allow four to six weeks delivery
OFFER EXPIRES OCT. 31, 1983

The easy step

Removing the paint and varnish . . . with versatile KWIK ALL-PURPOSE PAINT REMOVER

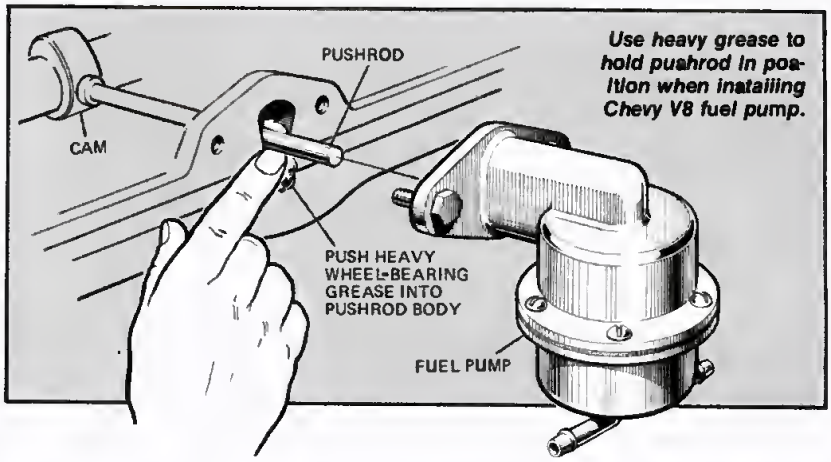
Remove all the paint and varnish on the job easily — and you're the boss! KWIK All-Purpose handily does the job for all kinds of wood and synthetic surfaces. Apply . . . then wash or scrape right off. The choice of professionals, yet so easy to handle. From America's paint-removing specialist. At your local paint or hardware dealer. If your dealer doesn't have KWIK, write: Chemical Products, P.O. Box 400, Aberdeen, Md. 21001.

CAR CARE GUIDE: 25 TIPS FROM THE PROS

20 Fuel-pump installation

Some fuel pumps, such as those used on many Chevy V8s, use a pushrod to activate the pump's rocker arm. When you replace the pump, the pushrod has to be positioned up in its bore before the new pump can be installed. The problem is that the pushrod tends to slide out of position before you can get the pump on. If you push some heavy wheel bearing grease into the pushrod housing with your finger it will hold the rod in position long enough for you to install the fuel pump.

To make sure that the pushrod is in the correct position, first press it into the housing. Have someone momentarily crank the engine with the ignition key until you feel the pushrod move to its innermost position. Then insert the grease.



Use heavy grease to hold pushrod in position when installing Chevy V8 fuel pump.

21 Belt quieter

A shrill, high-pitched squeal from under the hood usually means a slipping drive belt—either fan, power steering, air pump, alternator or air conditioning. The proper fix for this is to tighten the adjustment on the belt or replace the belt if it is worn or glazed. A temporary measure to quiet the squeal and sooth your nerves is to apply some bar soap to the offending belt while the engine is idling. Be very careful not to catch your fingers between the belts and pulleys, and keep them clear of the fan.

To lessen squealing sounds produced by a slipping drive belt, apply soap to the belt while the engine is idling.

22 Thread helper

If a sheet-metal screw starts to lose its grip because the hole is slightly stripped, there are a variety of inserts to cure the problem. But there's a simpler fix you can use if the hole isn't excessively enlarged and if the screw doesn't require excessive torque in its application. Merely wrap the screw threads with Teflon tape (available at hardware stores). One or two layers of tape should give the screw a new grip.

(Please turn to page 154)

Teflon tape wrapped around threads of sheet-metal screw tightens screw's grip.

NOW YOU CAN GET MOTORCRAFT'S HIGHEST QUALITY AT THE LARGEST REFUND EVER.

Get up to $19.50 in refunds on some of the highest quality automotive parts you can buy. From Motorcraft. Until November 30, get up to $9.50 back on Motorcraft spark plugs, filters, and oil. And, November through January, get a $10 refund on Motorcraft batteries. Motorcraft extended tip spark plugs give more power to a properly tuned, properly driven engine. Motorcraft FL-1A oil filters trap more dirt and last longer than any other leading filter. And Motorcraft Super Premium oil can save you gas. See your Motorcraft retailer today for complete refund details. It's your chance to get Motorcraft's highest quality . . . at the largest refund ever.

Get it together — buckle up.

Motorcraft

...FOR SURE

MOTORCRAFT

©1982 Archibald Mason

More Comfort for Drivers

New technology and the world's finest natural sheepskin come together in an exciting introductory offer.

My name is Archibald Mason. I am a wool merchant from New Zealand.

New Zealand has more sheep than people. Our lambswool rugs are the finest in the world. Every year thousands of Americans travel to New Zealand and buy our lambswool rugs and car seat covers.

I began selling lambswool rugs by mail in the United States in 1978. Since then I have supplied many rugs to American homes and offices, and every week we receive further requests for rugs from people who cannot visit New Zealand just yet. I have often been asked by Americans if we can supply car seat covers. New Zealand was the first country to use lambswool car seat covers and we have been making and using them for over 20 years. About three out of five new cars in New Zealand have lambswool seat covers fitted when new, and this figure is even higher for luxury cars. I am the largest single supplier of custom made car seat covers to New Zealanders.

STRONG FIBERS

If the wool in the photo seems too plush for your car seat, don't worry. We trim the wool to an even ¾" for car seat covers, so there is enough length for those springy resilient fibers to hold you off the seat and allow air to circulate behind and beneath you; and the ¾" wool is short enough for easy care and laundering. Yes, laundering! New Zealand tanners have perfected 'chrome tanning,' which means your car seat cover can be thrown in the washing machine and washed like a woolen sweater. It goes back on your car seat as soft and resilient as new.

When you buy your car seat covers, you need to know they will last for years. New Zealand wool is the world's strongest — and the secret is in the nourishment of the sheep. We have an equable climate with adequate rain falling evenly through the year, so those lush, green pastures you have seen in our tourist publicity supply plenty of food for the sheep all year. No summer droughts, no harsh winters. The wool grows into even, strong fibers. When your friends run their fingers through the wool in your seat covers, they may find it incredible that the world's longest-lasting wool can be so soft. But you will know, as your seat covers give you comfort for year after year, that you have bought from the people who know how to make the best seat covers.

THE BEST METHOD

But think about the fixing method. Some of the seat cover advertisements I have seen in the United States worry me — the fixing systems they are offering are clearly inadequate. As you slide in and out of your car seat, there is a tendency for the seat cover to move sideways on the seat, and it may move out of position. It took us many years of experience in New Zealand to develop the best fixing method, which holds the seat covers firmly in place without moving. On our Open Road model, we use color-matching straps in exactly the right places, and we even have light friction strips on the back of each seat cover to hold it in place. For our new Metropolitan seat cover, we have developed a special matching fabric which covers the entire back of the seat. So you will have the best of both worlds ... genuine sheepskin to sit on and matching fabric for a firm fit and luxurious wrap-around look.

Wool is a great insulator. When you enter your car on a hot day, the wool seat covers never feel hot, unlike the synthetic materials often used in car seats.

On a cold day, vinyl or synthetic materials drag the heat rapidly out of your body. Wool doesn't do this — wool adjusts slowly to your temperature, at the same time cradling you in thousands of soft, springy fibers. A great way to start any drive.

LUXURIOUS

But the greatest benefit is the air circulation. No matter how heavily you sit on a sheepskin seat cover, there is always air between the wool fibers, separating you from the car seat. As the air moves behind you, it carries away the moisture given off by your body. No more sticking to the seats, or damp clothing on a hot day. You may even find you use your air-conditioning less and thus conserve fuel.

We have seat covers in stock for all American and imported cars. They are in matched pairs to suit the front seats of your car. U.S. Customs have been paid and we deliver to you by UPS from our nearest warehouse within a few days of dispatch.

TWO CHOICES

You have the choice of two models.

If you like the luxurious wrap-around look, order Metropolitans in tan, honey or charcoal gray.

Matching pair, **$174.50**. Single, **$88.00**.

If you want to take advantage of an outstanding price (our New Zealand factories are overstocked at present), order Open Roads in tan, honey or charcoal gray.

Matching pair, **$115.00**. Single, **$60.00**.

(This price good only while stocks last.)

Please add **$5.50** per pair or **$3.50** per single to all orders for handling and delivery.

MONEY BACK GUARANTEE

Either style seat cover installs easily. Enjoy them and decide. If you don't admire them and feel you are driving in greater comfort, send them back within 30 days for a full refund.

CALL TOLL FREE 1-800-367-6002
Ext. PM-11. (24 Hour Service).

Tell us the make, model and year of your car. We will charge your credit card. Or, if you prefer to pay by check, please include your driver's license number for prompt processing of your order.

MONARCH TRADING CO.
OF NEW ZEALAND
Pier 39, Dept. PM-11
Honolulu, Hawaii 96817

"The rug in the photo is our white queen-size rug of never-shorn lambswool. It measures over 5 ft x 2 ft and our price is only $99.50 plus $5.50 delivery. Try our rug — it will be the nicest thing you ever did for your feet."

In Hawaii, call 523-5808 or visit our shop, The Prides of New Zealand, Ala Moana Center

Fastest way yet to time an engine!

Digital Mag Timing Tester makes timing lights obsolete

Remember the last time you hed to time an euto's engine? Remember how you first had to clean off the timing mark on the pulley which, in itself, wes difficult to find? Remember how you hed to walk back and forth end take several readings, beceuse you hed difficulty seeing the timing light to get en exact reedout? Would you like to be able to adjust en engine in one-third the time?

Now you cen, with the 3801 Meg Timing Tester from ALL-TEST, INC. It's e digitel tester thet meets todey's demends for precise timing for meximum motor performence and fuel economy. Just sit the 3801 etop theeir filter, plug it in; end read the exact timing end RPM directly on the display.

The 3801 wes designed to meet the precise timing demends of GM, Chrysler, Ford and AMC on todey's complex eutos.

OPERATION

The 3801 hes two pickups. An inductive pickup clamps on the #1 cylinder high tension wire. A megnetic pickup plugs into the brecket on the flywheel dampener, on most Americen cars menufectured efter 1977. The megnetic pickup senses a notch on the flywheel thet corresponds to the top dead center of the engine. The #1 inductive pickup senses the precise moment when the #1 cylinder fires. A powerful microprocessor calculates both ADVANCE (timing) end RPM end displeys both simultaneously on two bright LED displays.

CONSTRUCTION

The outer shell of the tester, made of ABS, is extremely tough. It is febriceted with superior components. It cen be easily read, even in bright sunlight. The instructions on both sides of the tester will not rub off, beceuse they are protected with cleer Lexan.

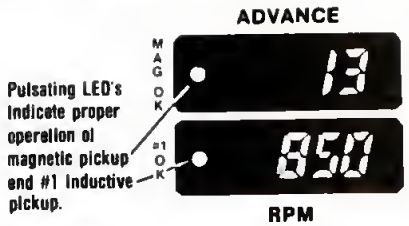
If you drop it from the hood of e cer, onto e cement floor, it won't break or lose accuracy. Compare thet to timing lights thet you cen't drop more than a few inches.

Finelly, every unit is put through five rigorous quelity control tests, including a 24-hour test, which is the equivelent of 6 months of actual operetion before we let it out of the factory.

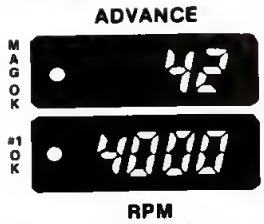
Sure all these things cost us more money. But our engineers wented to heve the best analyzer on the market. Just look et whet the tester will do:

FUNCTIONS

Initial Timing to Set Distributor



Checking Vacuum and Centrifugal Advance of High RPM



Inductive tach: just clemp the inductive pickup on eny spark plug wire and reed RPM on the display.

Diesel tach: GM diesel cars — plug the magnetic pickup in the receptacle by the hermonic belancer and read RPM on GM diesels. Use it to set idle speed, check governor speed, accessories, etc.

Unconditional Guarantee

ALL-TEST guerantees this timing tester unconditionally. Try it for 30 deys. If for any reeson you are not completely setisfied with it, return it for e complete refund or credit; and owe nothing.

WHAT ABOUT SERVICE: ALL-TEST will repeir or replece eny unit ebsolutely free of cherge for the first yeer end will elso repeir or replece the unit on e flet fee besis for the first five yeers.

The 3801 Digitel Mag Timing Tester, peckaged in dureble ABS carrying cese, comes complete with leads, pickups, adeptors, operating menuel, end warrenty. Order yours todey!

ORDER BY PHONE
Call **1-800-ALL-TEST**
(1-800-255-8378)
In Illinois, call collect **312/397-7970**
$169.00 plus $3.50 delivery.

☐ VISA ☐ master charge ☐ COD

Card # _____
Exp. Date _____
☐ Check or Money Order Enclosed
☐ Send more information about this and other products.
Name _____
Address _____
City _____ State ____ Zip _____
Phone ( ) _____

ALLTEST INC
Auto and Truck Diagnostic Equipment
Dept. PM-10 P.O. Box 65
Rolling Meadows, IL 60008

SAVE MONEY!

RISLONE REPLACES A QUART OF OIL AT CHANGE TIME

or when you're down a quart

RISLONE may cost a few cents more than motor oil additives in small cans, but remember — RISLONE is a big QUART yellow, red and black can and saves the cost of a quart of your regular motor oil, too.

For over 50 years, RISLONE has been used by millions of motorists to remove gum, sludge and varnish from their car's engines. These performance robbing deposits shorten the life of engines and make it cost more to operate them. RISLONE keeps engines clean and a clean engine starts easier, runs better and lasts longer.

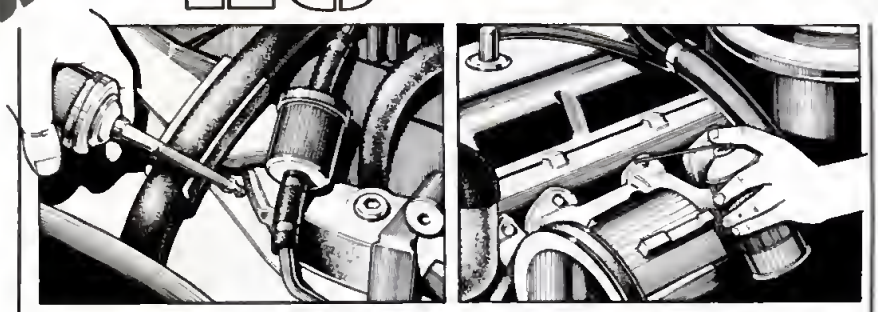
Get RISLONE today at discount stores, retail auto chains and parts stores everywhere.

FREE: 32 page LUBE TIPS booklet. Information, ideas and discussion about problems, performance and lubrication. Send self-addressed, stamped envelope 4½ x 6½ or larger.

THE SHALER CO.

Waupun, WI 53963
In Canada: Warren Packaging Co., Ltd.
Scarborough, Ontario, M1R 4G2

CAR CARE GUIDE: 25 TIPS FROM THE PROS



Intake-manifold leaks can be detected by squirting oil around mating surface (left) or spraying carb cleaner (right) in same area and noting changes in engine idle speed.

23 Manifold leaks

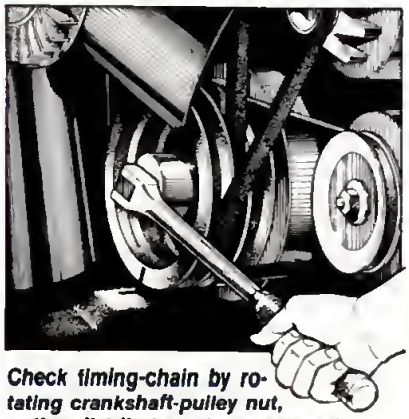
An intake-manifold leak will cause your engine to idle roughly. To check for leaks, take some carburetor and choke spray cleaner and blast it all around the manifold where it mates with the cylinder head. If there's a leak, the cleaner will be sucked into the manifold and the engine will idle noticeably rougher. An alternative is to squirt some light engine oil on the same area. The oil will momentarily seal the leak, causing the engine to idle smoother. Bubbles in the oil also indicate a leak. If a leak does exist, retorque the manifold to the manufacturer's specs. If that doesn't work, replace the intake-manifold gasket.

24 Timing-chain check

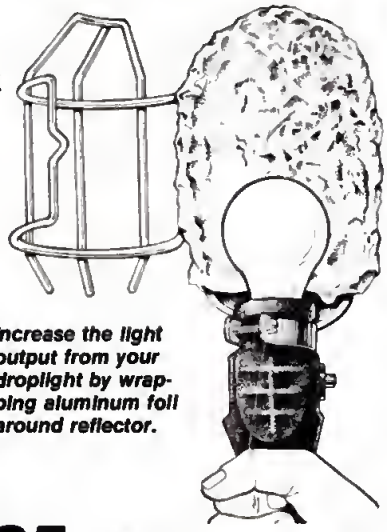
Timing chains sometimes stretch due to wear. When this happens the valve timing gets out of sync and the engine runs poorly and lacks pep. Checking the timing chain normally requires pulling the front cover on the engine. You can avoid this hassle by using a shortcut.

Remove the distributor cap. Place a large wrench on the crankshaft nut on the bottom pulley at the front of the engine. Rotate the engine *against* normal rotation until you see the distributor rotor start to move. Stop turning and mark reference points on the front vibration damper of the engine.

Now turn the engine in the direction of normal rotation. Check the distributor rotor and stop turning as soon as you notice movement. Mark a second reference line. Now check your reference marks for the amount of engine travel just before the rotor started to move. Measure the distance between your two marks. If the marks are more than two inches apart, your timing chain has excessive stretch, or your timing gears are worn, and need replacement.



Check timing-chain by rotating crankshaft-pulley nut, noting distributor-rotor movement.



Increase the light output from your droplight by wrapping aluminum foil around reflector.

25 Light brightener

For a more effective droplight, line the inside of the reflector with a 5 × 6-inch piece of aluminum foil, shiny side out. Fold the edges of the foil over the outside of reflector to keep it in place. When the foil becomes stained with grease or oil, just drop in a new piece. Make sure the bottom edge of the foil is clear of the base of the bulb to prevent any shock hazard. PM

Save $10,000 or more on your new home. Be your own builder.

No experience needed. Learn at home as NRI shows you how in professional Building Construction course.

You can save from 10% to 50% of the cost of your new home by building it yourself. And NRI can show you how. NRI's new professional course in Building Construction teaches you what you need to know to be a building contractor. And you learn at home in your spare time. Whether you want to build your own home, get a better job, or start your own contracting business, NRI can get you started right.

From Site Selection to Landscaping

By being your own contractor, you save at least 10% of the cost of the typical home right up front. Then, depending on how much of the job you do yourself, you can save up to 50%. NRI takes you through the job from start to finish in 70 lessons full of photos and diagrams to make learning easy. You begin by learning how to pick the best site, learn to read blueprints, estimate costs, follow the job through right to the planting of shrubbery and trees.

Learn Professional Secrets

Nothing's left out. You learn the trade practices and secrets of the pros. Masonry, carpentry, roofing, painting, even plumbing, heating and electrical work. You learn what good work looks like, tip-offs to bad or sloppy work. How to supervise jobs...when to bring in specialists...trade and financial practices...how to keep your job moving on schedule.

Training Built Around Energy-Efficient Home

You learn better because NRI training is practical training. You get over 100 action projects from scale-model construction to building actual framing sections. Lessons and projects are coordinated with a contemporary energy-efficient home designed especially for NRI. You keep these plans to build your own home or select from more than 50 low-cost optional plans.

Includes Seminar, $1,000 in Discounts

At no extra charge, graduates may participate in optional owner/builder seminar, meet other builders, get expert advice on local building codes and conditions. Or, elect individual consultation. And you get NRI builder discounts worth over $1,000 on materials and panelized house packages.

Free Catalog, No Salesman Will Call

There's much, much more to the NRI Building Construction Course. Send the postage-paid card today for your free catalog describing all lessons, projects, and opportunities in the building business. See how you can save big money by building your own home or earn big money by building for others. If card has been removed, write to address below.

Or check card for other career opportunities

Small Engine Repair

Learn to service lawn mowers, garden tractors, chain saws, tillers, outboards, mopeds, motorcycles and more. Includes professional tools like inductive tachometer, volt-ohm meter, torque wrench, valve spring and ring compressors and more. You learn by doing, actually work with 5 HP engine as part of your training.

Air Conditioning / Refrigeration / Heating with Solar Technology

Covers both residential and commercial fields, including lessons on solar heating, heat pumps, etc. Complete with professional tools, including top-grade vacuum pump, system analyzer, tubing and joint tools, leak detector, and more.

Electrical Appliance Servicing

NRI trains you to be a professional appliance repairman, even shows how to start your own full- or part-time business. Fix everything from toasters to refrigerators and microwave ovens. You even get professional tools and instruments like appliance multimeter and clamp-on ammeter.

Auto Repair and Servicing

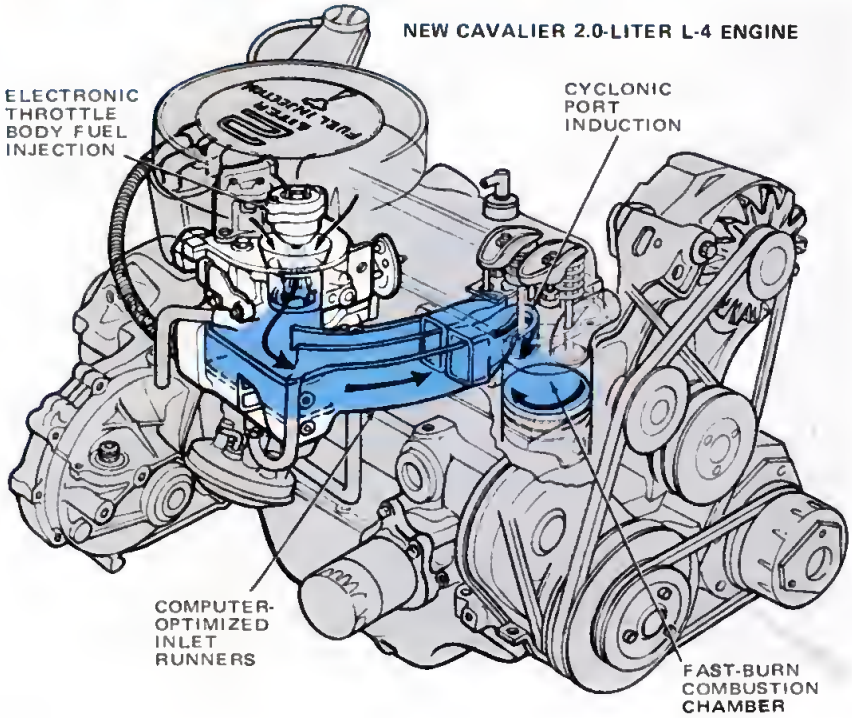
"Hands-on" training covers what you need to know from bumper to bumper. Includes professional tools like inductive timing light, ignition analysis and tune-up instrument, vacuum test pump, and precision oscilloscope for diagnostic work. Approved by Richard Petty, America's winningest stock car driver and NRI automotive consultant.

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

SATURDAY MECHANIC LOOKS AT...
The '83 GM Cars

GM's got fuel-stingy transmissions for your wallet and hotter engines for your soul.



The four-wheel-drive Chevy Blazer is GM's only all-new vehicle for '83.

A dog clutch holds the two pieces together in 4wd. When you shift the transfer case into 2wd for better fuel economy, you also trigger a vacuum circuit that moves the dog clutch to separate the pieces.

When this happens, the front axle's ring and pinion gear and the propeller shaft stop moving, reducing drag for even better fuel economy. Although the left axle shaft is not disconnected, its wheel turns only the differential side and spider gears, an almost insignificant power loss.

One feature of the Blazer 4wd system that is new for its type allows it to be shifted from 2wd to 4wd in high gear without coming to a stop. This was accomplished by putting a synchronizer in the transfer case.

Jumpin' J

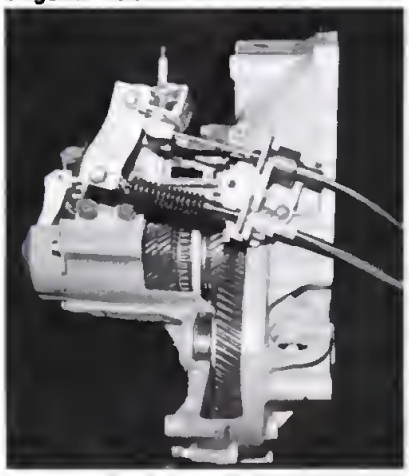
The J-car was GM's big disappointment in 1982. It had a host of startup problems, coupled with lackluster performance.

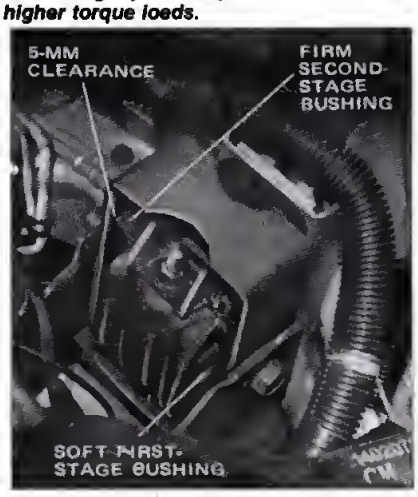
For '83, the J has no more horsepower (it's still 88), but torque is up 10 percent from 100 to 110 ft.-lb. and it peaks at 2,400 rpm, vs. 2,800 in 1982. These changes result from enlarging last year's 1.8-liter engine to a full 2.0 liters.

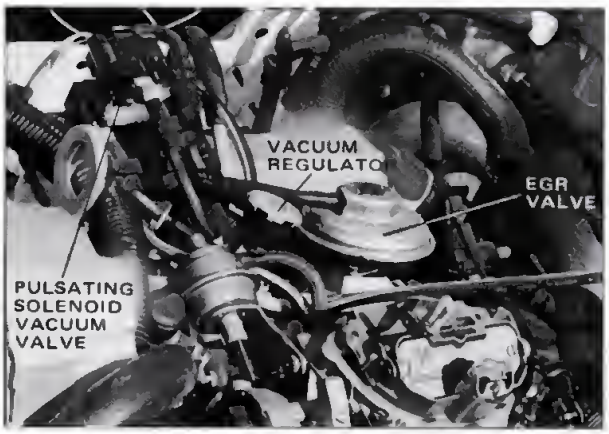
The '83 changes include throttle body fuel injection (TBI), a reworking of the engine, revised rear axle ratios and a five-speed transmission. There's also a new power-train mount that reduces idle speed engine shake.

TBI was the most important change

Bigger, higher torque engine (above) for Cavalier uses computer-controlled fuel injection and more efficient intake system. Five-speed transaxle (below left) can be ordered on Js, Chevettes and 1000 models. J-car idle shake is lessened by two-stage transaxle mount (below right). First stage lets engine move slightly to dissipate shake. Second stage restricts additional movement under higher torque loads.







Computer-controlled pulsating solenoid valve (left) makes for tight EGR control. A new casting process eliminates porosity on the Pontiac 6000 STE wheel (right). Electronically controlled on-board air compressor on STE operates rear air shock to keep the car level. The compressor hose has a gauge (below) to inflate tires and toys.

for performance. The unit, which is similar to thet introduced on the 2.5-liter Iron Duke in 1982, just wasn't ready for the 1.8-liter Chevy J-cer pushrod engine last yeer, so GM went with the carb.

In addition to TBI, Chevy increased engine displacement from 1.8 to 2.0 liters by lengthening the stroke 6 mm (¼ in.). Rods ere shortened 3 mm so the same engine block could be used.

The cylinder head is modified by incorporating swirl ports. These U-shaped ports, called cyclonic port induction, turn the air around, so it swirls into the combustion chember. The swirl results in e more uniform fuel mixture that not only burns more completely, but much fester.

Because the fuel burns faster, the spark can arrive later without affecting performence. The fest-burn cylinder heeds contradict the old thinking about improving performance by increasing the spark advance.

In fact, with less spark advance, the engine is less likely to knock. So the compression ratio can be reised—end it was (from 9.0 to 9.3). This improves engine efficiency.

The new five-speed trensmission is made by Isuzu, GM's Jepanese effiliate. It has a 3.92 to 1 first gear ratio compared with 3.53 to 1 for the four speed, which also helps off-the-line performance.

The idle shake problem was hardly unique to the J-car. Just about every trensverse four-banger, including those from Japan, suffers from it.

Chevy's cure is a two-stege trensaxle mount. The first stage is e soft rubber bushing that allows the engine to move fore-eft et idle, dissipating the shake energy.

The power train can't be allowed to

rock too much or it may grind against the body, stretch cables, and so on. So after 5 mm of movement (enough to teke care of the idle problem), the mount comes up against a second stage. This is a much firmer rubber bushing that retards further movement. The second stege works when the car is going down the road and the engine reacts to the greeter torque being developed.

The new design reduces idle shake, as measured at the steering column, by 75 to 90 percent.

Don't bother to knock

Buick is now using a piezoelectric sensor to tame engine knock. The unit, which generates electricity by exerting pressure on e crystal, sends a signal to the electronic control unit to reterd the spark and evoid knock. The system is more accurate than the previous accelerometer.

Gas meter

Buick now hes more accurate EGR control with a new pulse-width-modulated system. An on-board computer controls a solenoid vacuum valve that pulsates (opens end closes rapidly) to regulate vacuum flow to the EGR valve. Less vecuum equels less exheust ges flow. The system debuts on the 3.0 V6 Century and most 3.8 V8s.

Shift trick

Remember the vacuum modulator, that little diaphragm unit threaded into the transmission? Connected by vacuum hose to the carb, it responded to chenges in the engine vacuum to signal the transmission to shift gears. In the mid-'70s, GM dropped it in favor of a cable to the throttle linkage.

Now the modulator comes back in 1983, on e new automatic four-speed overdrive transmission with lockup converter. The new trensmission will be pert of a transaxle on the A-car diesel V6, sterting in the middle of the model year. The Cutless Ciere probably will be the first A-car to get it, followed by Celebrity, 6000 and Century.

But the cable will be used also. The Hydra-Matic engineers found out that the cable still is the best way to get a shift signal. It doesn't vary with changes in altitude. As does engine vacuum. However, it doesn't provide the kind of informetion needed to tailor the transmission's hydraulic pressure. The idee is to transmit maximum pressure for maximum hold by the clutches end bands at maximum torque, so there's no slippege.

The diesel doesn't produce manifold vecuum, but it hes e vacuum pump in the place normelly occupied by an ignition distributor. The vacuum it produces flows through a little regulator mounted on the fuel injection pump. This regulator controls vacuum flow according to eccelerator link position, so the modulator gets a signal that is proportional to throttle position.

Three on the floor

The new Hurst Olds automatic gets a three-lever shift system. The lever closest to the driver has the normal pattern from PARK down to DRIVE. Put it in DRIVE

(Please turn to page 160)

POUR IN

SPRAY ON

A TUNEUP

When a car needs a tune-up, the symptoms are much like those of a dirty fuel system: Hard to start, rough running, stalling, loss of power.

So before you spend $60 or so on a tune-up, try Gumout. Gumout Liquid in the gas tank cleans deep into carbs, down into manifolds, keeps valves clean, too. And Gumout Jet Spray cleans linkages, carb throat, throttle plate and more.

Gumout Liquid and Jet Spray—together they help engines run smooth. Help save gas, too. So when your car starts acting like it needs a tune-up, try Gumout first. It might just save you a bundle.

GUMOUT. THE BETWEEN TUNEUPS TUNEUP.

Gumout is a division of the company

(Continued from page 159)

and it goes from 1 to 2 to 3. Push it up a notch and it goes into overdrive.

The second lever picks up with the first one in DRIVE. It permits the driver to do a 3-2 or 2-3 shift manually. The third lever can be used with the first in DRIVE and the second in 2. It allows the driver to do the 2-1 or 1-2 shift manually.

The Lightning Rods setup, however, is primarily for show. There's only one cable from the three levers and only one operating lever at the transmission.

Heavy performance

Like the GM J-cars, the big 1982 Cadillacs were panned for poor performance. So Caddy has upped the torque from 190 to 200 ft.-lb. and horsepower from 125 to 135 on the 4.1-liter V8.

The extra performance comes from an exhaust crossover restrictor in the intake manifold gasket, so less exhaust gas passes through. The manifold runs cooler and engine performance goes up. This should be a modification that can be retrofitted. There's been a general retuning, including a new spark-advance curve and fuel-flow calibration.

A free-breathing exhaust system for the Fleetwood Brougham and deVille is similar to that used in the front-drive Eldorado and Seville. It includes larger diameter piping, a retuned muffler and addition of a resonator.

The Cadillac engine computer used with the 4.1-liter V8 has more on-board diagnostics than any other. And in 1983, it gets yet another code.

The new one, No. 53, is the first to cover the condition where the distributor signal suddenly drops to zero. This could occur if there's a poor connection in the distributor circuit.

When a problem is detected, the CHECK ENGINE light goes on. You can probe the computer's memory by simultaneously pressing the OFF and WARMER buttons on the a/c control panel, and following a shop-manual-prescribed procedure. The trouble code will be displayed on the a/c temperature digital readout.

Cleans up its act

Oldsmobile has a new diesel injector that uses extra clearance between the needle and nozzle. A flute on the needle causes it to turn as it opens. The resulting "wobble" results in a self-cleaning action, even though Olds engineers can't explain why. PM

WORTH WRITING FOR

LOOKING FOR IDEAS ON CAR CARE, AUTOMOTIVE AND HOME PRODUCTS? CHECK THESE LISTINGS. THEN USE THE COUPON BELOW.

609 Drive Cool/Save Fuel
Brochures available from Hayden explain how keeping oil temperature down can extend the life of your car's transmission and engine. Plus, how to take a load off your engine . . . recover 8 to 25 horsepower and save fuel. Free

610 Give Your Car Added Life
Four-color brochure from Cyclo Automotive Products describes a complete line of auto cleaners and treatment products. Designed "for the life of your car." Includes carburetor, engine and brake cleaners, fuel treatment, and lubricants. Free

611 Auto Body Shape-Up
Do-it-yourself auto body repair can be fun and easy with Sanin International. Their Auto Body Repair Kit contains tools and everything needed to repair dents, holes and rust spots. Includes complete easy-to-follow, step-by-step instructions. 4-color, illustrated brochure and tools catalog. Free

612 Car Care . . . At Your Fingertips
If you drive a car, you need POPULAR MECHANICS' MASTER KEYS TO CAR CARE. This information-packed series of illustrated brochures contains step-by-step instructions to help you maintain your car and keep it looking like new. Convenient size makes this valuable guide the handiest tool in you car care kit. Only $4.95

613 Spoil Your Car
Front spoilers can save fuel and promote safety. 24-page, full-color catalog from Kamei describes its wind tunnel testing and aerodynamic automotive products. $2.00

614 A Grease For All Seasons
Super Lube with Teflon is a clear non-staining lubricant that transforms a penetrating spray to a grease. Sample and literature. Free

615 Don't Be in A Fog
Fogged vision can be aggravating and dangerous. "Never Fog" from North American Oil is designed for interior auto glass, goggles, eyeglasses and bathroom mirrors. Cleans and protects in a single action. Free brochure.

616 Automotive Performance
Here's an invitation to discover dramatic horsepower and fuel economy gains from an Edelbrock Performer intake manifold and camshaft package. The Performer Test Series, featuring torque graphs, fuel economy and acceleration data, plus a Mini-Catalog illustrating the complete product line. Free

617 Steel Replacement Panels
60-page catalog from Mill Supply offers die-formed steel replacement panels to replace those damaged by rust and collision. Over 1,000 different panels available for many American cars, small pick-ups and vans. $3.00

616 Rocket-Power Your Car
Rocket Automotive Products' new catalog has 80 pages of stock replacement, high performance and cosmetic accessories for almost everybody. Over 1,700 parts are described. Popular Chromatized Engine Parts and Hub Caps are illustrated in four-color. $2.50

619 Specialized Automotive Hand Tools
With the right tools, you can do jobs right and do them easier. Lisle Corp. offers a catalog of more than 100 unique auto service tools . . . for almost *every* job. Specialized hand tools that can make the do-it-yourselfer into an efficient and capable mechanic. $1.00

620 Keep Your Car In Peak Condition - Basically
Popular Mechanics' BASIC CAR CARE ILLUSTRATED shows you how to perform simple maintenance checks, prevent breakdowns, do tune-ups and handle basic repair jobs. Includes manufacturer's specifications for each make and model of domestic car by year. $13.00

621 How To Radiate Warmth
Radiant King would like you to know that kerosene heaters are 92% efficient. Full-color catalog with complete specifications describe five new portable UL listed models. From 8,000 to 20,000 BTU's. Ideal for home and office. Free

622 Magnetic Inside Storm Window
Brochure demonstrates how to stop heat loss, air infiltration and condensation through windows with POLLYMAG, the magnetic inside storm window. Available in regular and heavy duty grade, and widths up to 83". From Kansas Diversified Products. Free

623 How to Talk Without Using Your Hands
Talkman is a new miniature, lightweight, voice-activated, hands-free two-way radio. Ideal for active motorcyclists, bicyclists, snow skiers, hunters and on the job. 4-color brochure from Standard Communications. Free

624 Compute Your Future
The future is *now* with the new personal computers. 48-page, full-color catalog describes hardware, software, accessories and books. From Radio Shack. Free

625 New View For Home Heating
A 12-page, four-color catalog from Russo Manufacturing includes complete information and specifications on the company's line of wood stoves, coal/wood combo stoves and fireplace inserts. All feature the famous Glass-view® window. Free

626 Stop Costly Energy Leaks
TOUCH 'N FOAM Instant Insulation can be used in summer and winter for spot insulation. Fills cracks in walls and around windows, doors, electrical outlets and pipes. Brochure from Convenience Products. Free

627 Year-Round Lawn Care
Caring for your lawn is not a summer-only concern. Seasonal issues of *Lawn Care*, from Scotts contain when-to-apply checklists, how-to articles, and the latest information on lawn care. A 2-year subscription to this colorful publication is available . . . Free

---

Popular Mechanics 10/62
Box 1716, Sandusky, Ohio 44870

This Coupon Expires December 31, 1982

Please see that I receive the items checked below

☐ 609	☐ 614	☐ 619 $1.00	☐ 624
☐ 610	☐ 615	☐ 620 $13.00	☐ 625
☐ 611	☐ 616	☐ 621	☐ 626
☐ 612 $4.95	☐ 617 $3.00	☐ 622	☐ 627
☐ 613 $2.00	☐ 616 $2.50	☐ 623	

Total money for priced items $ _____
Service Charge $ _____50
Total money enclosed $ _____
Total items requested _____

Name (Please Print) _____

Address _____

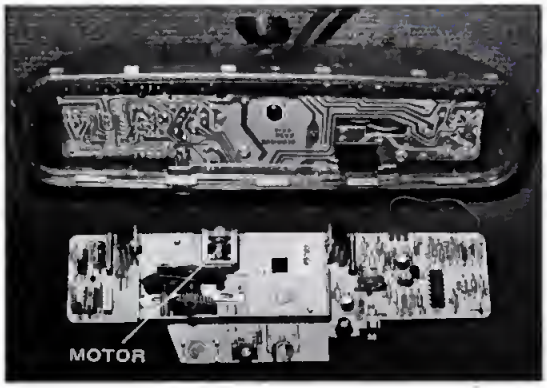
Town _____ State _____ Zip Code _____

(Please send cash, check or money order made out to POPULAR MECHANICS. No stamps, please.)

Note: Popular Mechanics processes your requests for the above information and forwards these inquiries to the organization making the offer. Each company mails the material directly. Your order will be on its way to you within 90 days.

SATURDAY MECHANIC LOOKS AT...
The '83 Ford Cars

Can we interest you in an automatic, digital, power rear-view mirror? How about a glued-together car?



Power-dimming rear-view mirror uses two photocells that sense light levels at front and rear of car. System is triggered when rear-facing sensor detects more light than front sensor. A tiny motor and drive train goes into action to flip the mirror to the nonglare position. The option is expected to cost $100.

We thought the Japanese had the corner on technological overkill when they began selling talking dashboards, air-bladder adjustable seats, whoop-de-doo digital gauges and navigational satellite receivers in their cars. Not to be outdone, Ford had offered an automatic, power-dimming, rear-view mirror.

Are you tired of flipping the day-night, rear-view mirror every time a car is on your tail? If you buy a 1983 Ford luxury car, you can get electronic circuitry and a little motor drive to do the job.

A new device uses two photocells: one aimed forward to tell the electronics if it's day or night (or on a brightly lit street), a second aimed to the rear. During the day, the system is off. At night it comes on automatically. If the rear-facing cell detects more light than the other one, it triggers a motor, which turns a gear train. The latter operates a cam to turn the mirror to nonglare position. A knurled knob on the mirror case adjusts sensitivity of the rear photocells circuit.

A tag of about $100 is expected. The mirror will be available on all Lincolns, plus Cougar and Thunderbird.

No room to spare

Problem: you have 14 inches for a manual transaxle and your four-speed takes 13¾. How do you fit in a five-speed?

Ford engineers realized they couldn't just lengthen the output shaft and add another gear. That would make the transaxle two inches longer and it wouldn't fit in the Escort/Lynx or the EXP/LN-7.

Their solution—slightly increase the gearbox diameter for an additional shaft at the top. This holds the fifth gear and its synchronizer at one end, and an output gear at the other. The output gear meshes with the differential ring gear, just as the output gear for the one-to-four-speed shaft does.

When the driver shifts into fifth, a fork arrangement simultaneously engages the fifth-speed synchronizer and disengages the fourth speed.

The new gearbox is 13.92 inches, 0.2-inch longer than the four-speed. The gear ratio in fifth is the same as in fourth (1.02 to 1). However, the output gear that meshes with the differential ring gear has a different ratio from that on the one-to-four speed shaft. Fifth gear actually gives an overdrive ratio of 0.75 to 1.

Ford might have been able to redesign the four-speed transaxle with smaller gears and put No. 5 in on the 1-4 shaft. This would have substantially reduced torque capacity and reliability—the Escort-Lynx with the 1.6-liter Four might have been okay, but the same gearbox has to go into the Topaz-Tempo with the 2.3-liter engine this winter.

Like the four-speed, the new Ford transaxle has internal shifting rails and a floating-position shift lever. A design that eliminates cables and adjustments.

Tight and rattle-free

If you hate to take your new car back to the dealer for dashboard squeaks and rattles, you should know the feeling is mutual. He knows that unless he's lucky, he isn't going to find the rattle, let alone fix it.

Recognizing that dashboard noise is

(Please turn to page 164)

Sears Tire & Auto Centers

WE INSTALL CONFIDENCE

SEARS HAS MORE SHOCKS THAN THE ROAD OF LIFE HAS BUMPS.

It really doesn't matter what kind of shock absorber your car needs. Sears probably has it in stock. Right now. Right in your neighborhood.

We start with Sears Best SteadyRider® Radial Tuned shocks. And there's our air adjustable and booster shocks for hauling loads and towing trailers.

Amazingly, Sears lowest-priced shocks are just $5.99, each. Prices apply only to the continental United States.

Then there's our Super Duty shocks for light trucks, vans, and off-the-road vehicles. Finally, Sears has MacPherson cartridges and struts for many imported and front-wheel drive cars.

Almost anything you could need. And chances are, you need something right now. In fact, three out of every four cars on the road need new shocks right now.

The problem is, shocks wear out slowly. So slowly, you might not notice that they're going. But you can still hit a pothole in a hurry. And that can mean big trouble holding your car on the road.

From heavy-duty shocks to air adjustables to MacPherson struts, Sears has more shock absorbers in stock than almost anybody.

The fact is, shocks do a lot more than give you a smooth ride. They hold your tires on the road. Compared to worn out shocks, new ones give you better braking, improved stability, and quicker maneuvering. That's where Sears shock absorbers ride to the rescue.

For instance, our conventional shocks have 40% more ride control area than original equipment on most new cars.

And Sears Best SteadyRider Radial Tuned shocks are temperature compensated. That means you get more control when it's hot, more comfort when it's cold. It also helps keep the SteadyRider steady.

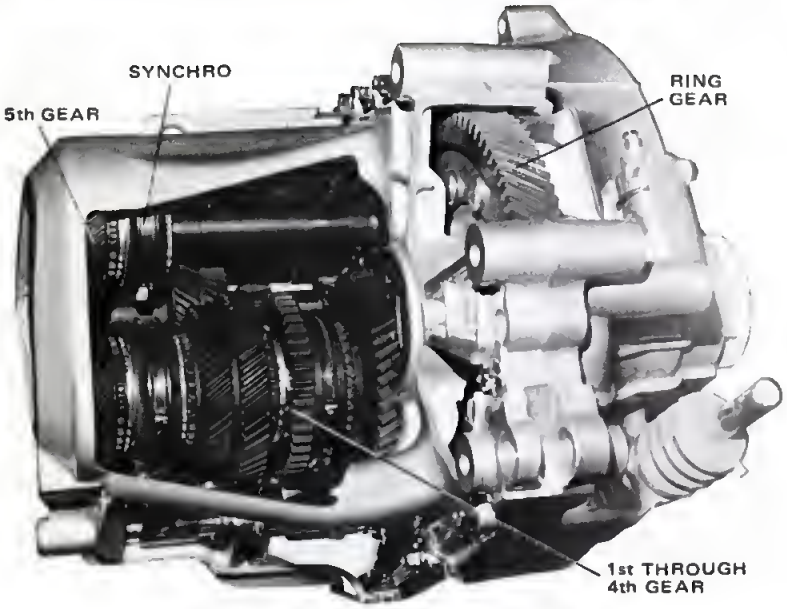
Best of all, Sears shocks start at just $5.99, each. We'll also install them for you. And we'll do a professional job at a reasonable price.

One more thing. There's no extra charge for confidence.

You can count on

Sears

© Sears, Roebuck and Co. 1982



Five-speed transaxle fits into space of a four-speed by increasing gearbox diameter and adding a shaft for fifth gear and its synchronizer at the top of the gearbox.

a no-win situation, Ford is executing a program designed to prevent it on the '83 cars. Engineers found that most noise is due to contact between plastic parts, primarily bezels to the instrument panel. They began by welding the instrument-panel frame to prevent movement of sections that had been held by screws. Then they:

- Molded locating pins into the dashboard bezels to fit holes in the instrument panel to improve alignment.
- Added antirattle clips to retaining tabs of the bezels to keep them from moving.
- Molded turbo-tipped standoff pins into the bezels to prevent plastic-to-plastic contact at problem areas.
- Molded rectangular raised sections around screw holes.
- Installed "prevailing torque," U-shaped, stamped-metal nuts for the retaining screws. The nuts have metal tabs that partly restrict tightening of the screw, so when the screw is tightened through the restriction, it won't loosen. If you must remove a screw through a prevailing-torque nut, you can reinstall it up to two times.
- Installed foam tape on the back of bezels to lessen plastic contact.

EEC IV

Just when you thought it was safe to lift the hood of a Ford, the big computer system is back. Ford had just about eliminated computers on all but a handful of cars last year. But for 1983 a new Electronic Engine Control is standard on all Escort-Lynx with electronic fuel injection and many forthcoming Tempo-Topaz models.

Fortunately, the new computer, EEC IV, should be less fearsome than previous systems. It will carry 80 trouble codes (not all in every car) and have a convenient underhood diagnostic connector into which you can plug a voltmeter. This is similar to what Ford did with its Microprocessor Control Unit, but the checkout will be simpler, Ford says.

EEC IV is significantly different from the previous model. It's much smaller but can work much faster (up to a million commands a second). Some changes provide meaningful benefits.

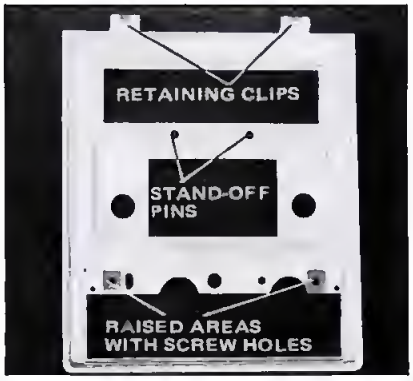
First, a knock sensor is wired to a listen-and-readjust circuit that retards timing a little at a time, until the knock is gone.

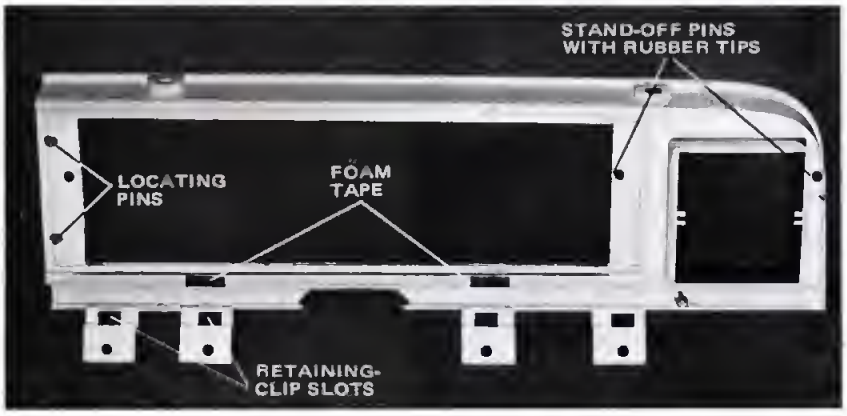
A flap-type airflow sensor to control fuel injection is a new addition. Other companies are looking for better sensing than the flap, on which air pushes to operate a variable resistor, but Ford says that the flap is the best combination of price and performance it has found. Response time with the flap is significantly better, Ford claims.

Unlike the throttle body fuel injection, the system on the 1.6-liter Escort engine uses a separate injector at each port. The computer triggers each one of them during every engine revolution, so the flow rate is scaled down.

Idle speed is controlled by the computer operating a valve in an air bypass around the throttle. The job is done with a new, infinitely variable position solenoid.

The forthcoming Tempo-Topaz front-drives will get a turbo to go with a 2.3-liter engine. EEC IV will control the turbo





Rattle-resistant dashboard design uses techniques (right and below) to prevent plastic-to-plastic contact. Screws in instrument panel are replaced by welds.

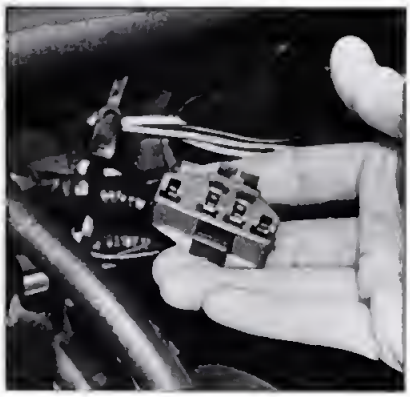
wastegate with a new solenoid valve.

If the engine knocks, the computer will know if the engine is in a turbo-boost condition from the airflow sensor. If it is, the computer first will reduce the boost pressure. If necessary, the computer will retard the ignition timing.

There's a glued-together Ford in your future. Production-car testing begins this fall with the 1983 Thunderbird.

If you've got a mental picture of a car coming unglued at the seams, forget it. This isn't library paste, but a polyvinyl-chloride sealer containing a superstrong adhesive made by the Uni-Seal Corp.

The glue has a shear strength of 800-



Voltmeter plugs into this diagnostic connector for Electronic Engine Control (EEC IV) computer to check out system.

900 p.s.i., well above the 600-700 p.s.i. of a conventional weld. All that has to be proven is if the glue will resist deterioration for the life of a car body.

For the '83 T-bird test, the glue will be applied to eight locations in addition to the welds. However, this will not affect the validity of the test. The decision to go ahead with this conservative check follows an '82 T-bird factory-test with 667 spot welds and 10 inches of arc weld actually removed in favor of the glue.

The '83 T-bird test is due to be repeated on the '84 Continental Mark VII. If both these tests prove successful, some welds will be removed in favor of the glue shortly thereafter.

Use of glue has many potential advantages. Applied as a continuous 3/16-inch-diameter bead, it joins the body better than spot welds. The result is less metal shake, a quieter interior and better ride.

Structural adhesive, as the glue is called, has proved itself in aircraft applications. Potholed roads are next. PM

ExSil™... Can For All Seasons

New, advanced technology EXSiL™ Spray & Lube provides superior lubrication and protection year-'round.
Better lubrication, in fact, than WD-40.
TEST RESULTS PROVE IT.*

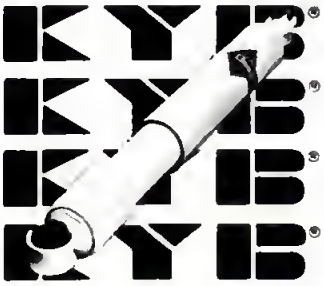
$1.00 Rebate
COUPONS AT PARTICIPATING RETAILERS THROUGH 12/31/82

ExSil™... ask for it by name.
WE BRING GOOD THINGS TO LIFE.
GENERAL ELECTRIC

*Trademark of General Electric Company
*Fslex tester steel pins and jaws. Results available on request: GE Silicone Products Division, Waterford, NY 12188

Hug the road better...longer.

Bobby Unser, auto expert and champion driver says **"With Gas-a-just Shock Absorbers you'll hug the road better than with ordinary shocks** because Gas-a-just's patented design seals in nitrogen gas and all-weather fluid under pressure to give you smoother, consistent performance throughout the full stroke of the shock absorber."



Gas-a-just® Shock Absorbers

Great with Radial Tires, too!

And this superior performance lasts throughout your trip because Gas-a-just's design eliminates the foaming and aeration which is so common in ordinary shocks and causes their performance to become erratic and fade as you drive.

Insist on Gas-a-just Shock Absorbers

Modern as Tomorrow

KYB®
KYB Corporation of America
901 Oak Creek Drive
Lombard, IL 60148

SATURDAY MECHANIC LOOKS AT...

The '83 Chrysler Cars

Crunch-free shifting and squeal-free brakes. It's the little things that count.

In transition year '83, Chrysler has mede good use of its limited resources and done e worthy job of improving the existing hardware.

The bread-end-butter, 2.2-liter Four is reliable and versatile. It does double duty as a performer (in the Charger) and a fuel-stretcher (in the Ks and Super Ks).

This year sees the 2.2 with more power. There's a redesigned combustion chamber which ups compression from 8.5 to 9.0 and gives more swirl to the mixture for better burning.

Other mods include tuned intake and exhaust manifolds and smaller ports for higher gas velocities.

All this adds up to a boost in ponies from 84 to 94 at 5,200 rpm. Torque is up from 111 to 117 ft.-lb. et 3,200 rpm.

Fuel economy moves up about one mpg because of the higher compression and fuel-cutoff solenoid thet works on deceleration.

In spite of the added power, the 2.2 doesn't kick up enough sand for use in the new E-body car. Standard powerplant here is the 2.6, which produces the same horsepower as the 2.2, but higher torque: 132 ft.-lb. at 2,500 rpm.

The 2.2 may yet be used in the B, as the mill is slated to get fuel injection by winter and a turbo by next fall.

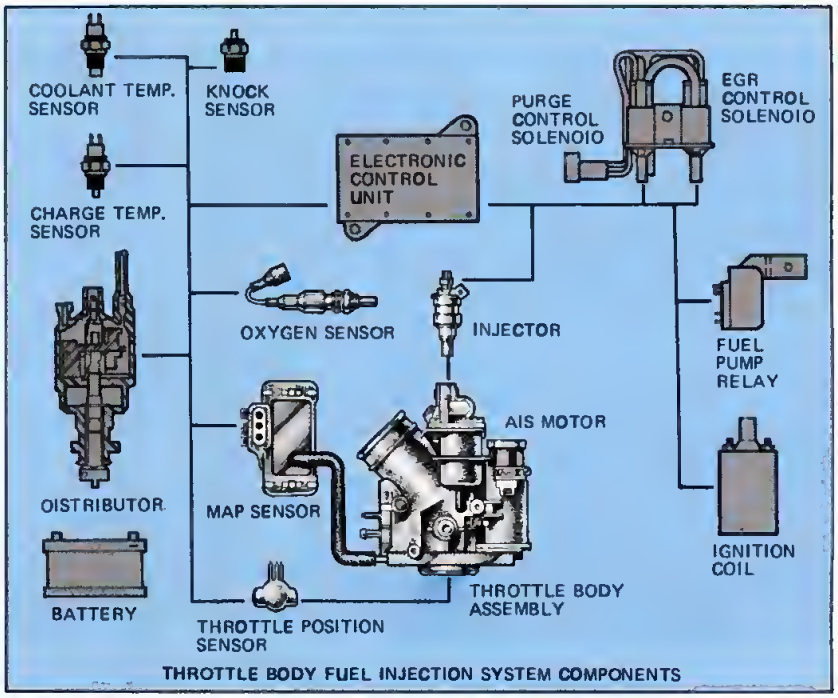
Stretching the K-car

Chrysler's new E-body (Chrysler E Class and Dodge 600) is about seven inches longer than the Super Ks (LeBaron/400). The extra room is added in the reer legroom and trunk areas.

Weight of the E is over 2,500 pounds so Chrysler is taking no chences on marginal braking. Big discs up front and big rear drums are eccommodated by standard 14-inch wheels.

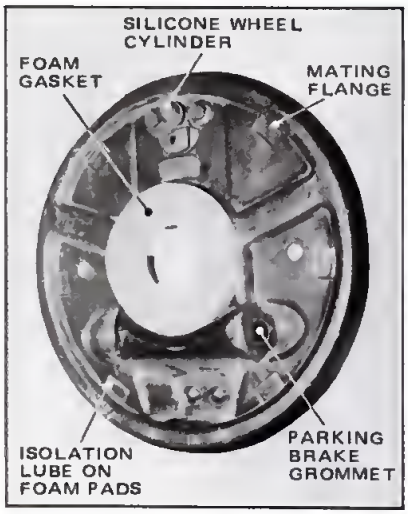
The first of the Jepenese turbodiesels

(Please turn to page 168)



THROTTLE BODY FUEL INJECTION SYSTEM COMPONENTS

Available by mid-year will be this new fuel-injection system for the 2.2-liter, four-cylinder engine. It won't improve horsepower much, but torque and fuel economy will increase. Considerable engineering effort went into quieting noisy rear brakes (below). The drum (left) and backing plate were modified as shown.



NEW Digital Engine Analyzer!

Do it right and save money!

New Digital Engine Analyzer will help you tune up your car, truck, motorcycle, boat engine, or lawn mower. You won't have to pay the $28-35 per hour that service stations and garages charge. And you will know that the job was done right . . . because you did it yourself!

The 3706 is absolutely necessary for the complex cars '77 and newer; and it works on older cars, too. The same analyzer that professional mechanics use every day and spend $150 and more for, is available factory direct, saving both of us money. Read this ad. It is the same as appears in all the leading auto magazines for the professional mechanic. It's your assurance that you're getting a top quality professional diagnostic tester . . . because nothing less will do the job on the newer cars.

It tests 2, 4, 5, 6, 8 cylinder and rotary engines. It has a high-intensity, four digit display. It measures only 6-7/8" x 3-3/4" x 1-7/8" and weighs only 16 ozs. It's small enough to fit in your tool box. It works off the car's 12V battery and requires no other power source. You can use it for bench work with the optional 110V AC adaptor (p.n. 4550, only $25.00).

It tests what other testers won't. It measures tach on all ignition systems — including conventional, electronic, and CD (including GM C-3 and C-4). It measures volts — even on electronic modules in the newer cars. It measures ohms — even as low as .3 ohms for ballast resistors.

It checks the new computer controlled carburators (such as GM Computer Command Control, Ford's EFI, etc.). It checks all the sensors for the Electronic Control Modules such as throttle position, barometric pressure, engine coolant temperature, etc.

The outer shell of the tester, made of ABS, is extremely tough. It is fabricated with superior components. It can be easily read, even in bright sunlight. The instructions on both sides of the tester will not rub off, because they are protected with clear Lexan.

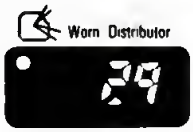
If you drop it from the hood of a car, onto a cement floor, it won't break or lose accuracy. Compare that to the analog unit that you can't drop more than a few inches And it won't be damaged by misconnection. It will withstand 50,000 volts on the test leads from a cracked coil.

Of course, it's autoranging. That means that all you have to do is select the proper function, and the correct number flashes on the screen. There's no need to decide between low volts and high volts. There's no need to zero the tester. The microprocessor does it all automatically. The unit uses a crystal oscillator that will maintain the same high accuracy, even after years of use.

Finally, every unit is put through five rigorous quality control tests, including a 24-hour test, which is the equivalent of 6 months of actual operation before we let it out of the factory.

Dwell 0° to 180°

Every number is shown in sharp crisp digits on the bright red LED display.



Worn Distributor

Unique worn distributor LED flashes to indicate a worn cam or bushing, in the distributor.

Tech 30 to 9999 RPM

Measures conventional, CD and electronic ignition systems. Hook up on primary side of the coil.

Volts 0 to 50

- Charging Systems Tests
- Electronic Control Module Tests
- Points resistance Tests. Bad diode LED indicates defective alternator diode, while engine is running.

LO OHMS 0.3 to 1000 OHMS

- Pickup Tests
- Ignition Coil Tests
- Electronic Control Module Tests
- Spark Plug Wire Tests

HI OHMS 1000 to 200,000 OHMS

(Reading automatically changes from LO OHMS to HI OHMS)

AMPS 0 to 600

- Cranking Tests
- Charging Tests
- Current Draw Tests (use included shunt)

Unconditional Guarantee

ALL-TEST guarantees this engine analyzer unconditionally. Try it for 30 days, if for any reason you are not completely satisfied with it, return it for a complete refund or credit; and owe nothing.

What about service? ALL-TEST will repair or replace any unit absolutely free of charge for the first year, and will also repair or replace the unit on a flat fee basis for the first five years.

The 3706 Digital Engine Analyzer, packaged in durable ABS carrying case, comes complete with leads, shunt for current measurements, operating manual, and warranty. Order yours today!

ORDER BY PHONE
Call 1-800-ALL-TEST
(1-800-255-8378)
In Illinois, call collect 312/397-7970
Only $145.00 plus $2.50 for delivery.

☐ VISA ☐ master charge ☐ COD

Card # _____
Exp. Date _____
☐ Check or Money Order Enclosed
☐ Send more information about this and other products.
Name _____
Address _____
City _____ State ____ Zip _____
Phone ( ) _____

ALLTEST INC
Auto and Truck Diagnostic Equipment
Dept. PM-10 P.O. Box 65
Rolling Meadows, IL 60008

"I've known Raoul since his sports car days. He's a perfectionist, and personally tests everything he sells. I trust him implicitly."

If you care about your car, you've just found your source. Raoul Balcaen's IECO supplies precision performance and appearance accessories for small cars. Raoul Balcaen tests every component before it's offered for sale. If it doesn't pass muster, you can't get it from IECO. The 1983 IECO catalog contains over 100 pages of the finest available parts and accessories for: BMW, Capri (European), Datsun, Honda, Mazda, Porsche, Mercedes, Rabbit, Scirocco, VW Bug, Toyota, Mustang/Capri, Corvair, Chevette, Vega, Pinto. Order your copy today!

RAOUL BALCAEN'S **ieco** THE ENTHUSIAST'S SOURCE

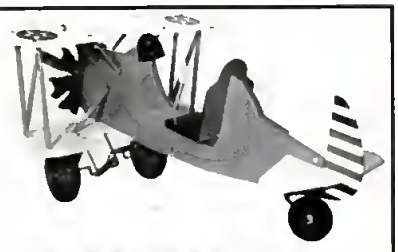
Yes! I demand only the best for my car. Please send your new catalog. I enclose $2 (refundable with order).
IECO 1431-M Broadway
Santa Monica, CA 90404
Phone orders: (213) 451-1738

Name
Address
City *State* *Zip*
I drive:
When in Santa Monica, visit our Showroom!

GARAGE DOOR OPENERS

BURGLAR ALARM For Home & Small Business • Radio Controlled • Buy Factory Direct & Save • Thousands In Use • Easy Homeowner Installation • Immediate Shipment UPS or PP • Free Brochure

HELPMATE Equipment Co. Dept. PM102, Baroda, MI 49101



STEARMAN PT-17

A riding Toy Airplane, pedal operated, stick control, plywood construction, minimum welding, easy to follow completely detailed drawings.

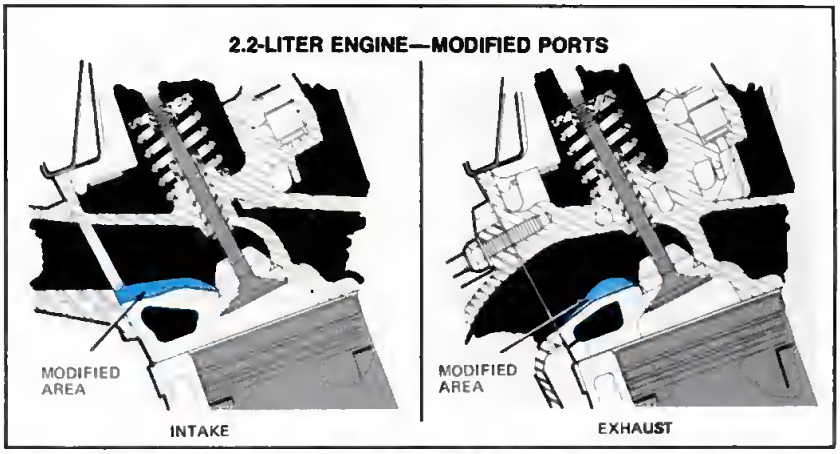
NOW AVAILABLE:

Stearman PT-17 - Fokker D-7 - Sopwith Camel - Plans, $10.50 Ea.

SMALL FRY

TOY AIRCRAFT COMPANY

709 So. State St.-Ukiah, CA 95482



Adding meterlei to the inteke end exheust passages creates desirable Venturi effect.

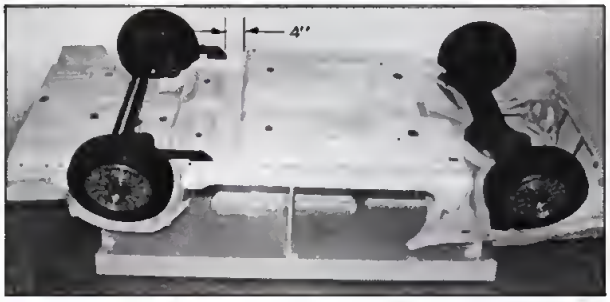
will make its debut this fall in the Dodge Ram 50 pickup, built by Mitsubishi. The 80-hp, 2.3-liter Four is built off the same 2.6-liter block and has the same "Silent Shaft" feature.

The turbo is made by Mitsubishi and has no waste gate. When boost pressure exceeds 12 p.s.i., a diaphragm device cuts fuel flow to the injection pump to slow down the engine. Chrysler expects the turbo, with a five-speed gearbox, to chalk up 35-mpg city; and about 50-mpg highway.

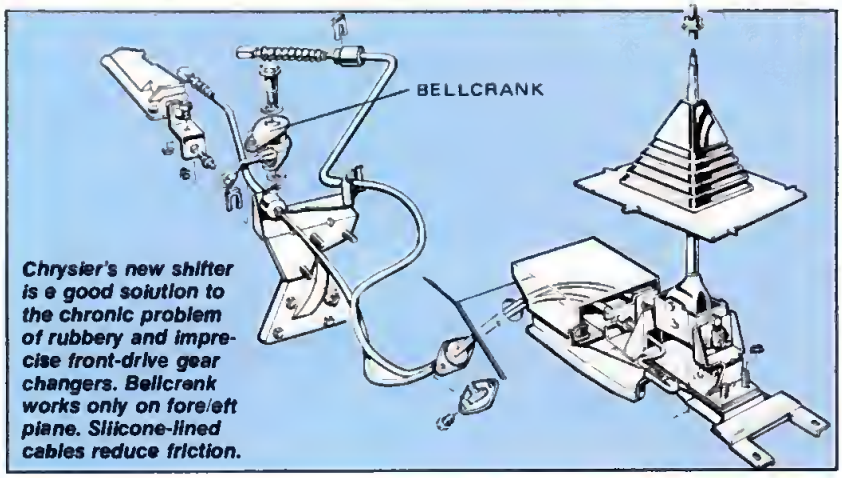
Finally a five-speed

Chrysler's front-wheel-drive cars get an optional, five-speed manual transmission this year, which is the first such unit to be designed and built in the United States.

The two top gears are overdrive ratios. Like the four-speeder, the end cover comes off with the gearbox in place, so the unit can be overhauled while still attached to the engine. The bellcrank, that swivel pivot used in cable (and rod) linkage systems, operates



Stretching a Super K involved addition of 4 inches to the floorpan just ahead of the rear wheelwells.

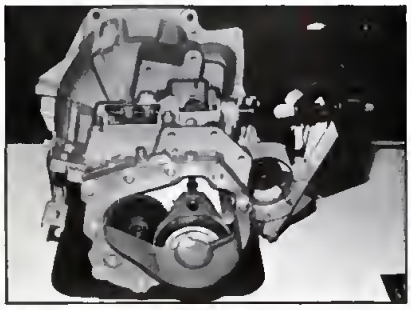


Chrysler's new shifter is a good solution to the chronic problem of rubbery and imprecise front-drive gear changers. Bellcrank works only on fore/aft plane. Silicone-lined cables reduce friction.

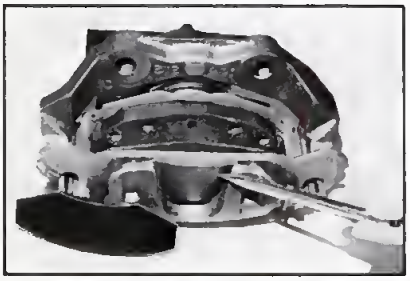
only when the shift lever is moved fore and aft (into or out of gear). So any friction in the bellcrank doesn't affect the position of the shift lever or linkage in the transmission. These are located by springs and detents, so the shift lever is always properly lined up to go into gear.

The shift-lever assembly is cable-operated, and the system is practically jamproof.

The five-speed comes with a choice of final-drive ratios: 2.20 for economy and 2.57 for performance. There s no choice in seating, however, as the five-



New five-speed transmission accommodates the fifth gear and synchro at the end of the gear housing.



Front discs get quiet treatment with addition of a metal plate coated on both sides with rubber and an adhesive.

speed comes only with buckets up front.

A lot of effort went into quieting the brakes without giving up performance. Linings are now riveted on instead of glued, and the linings themselves were reformulated by Bendix for quieter operation. Wider use of damped disc-brake rotors also cuts breke squeal.

Other screech-killing features include a stiff drum backing plate which doesn't emplify sound, rubber-coated-metal components in the caliper and special noise isolating lubrication on the backing plates' brake-shoe platforms.

The brakes are also designed with new sealing features which keep out moisture to slow rust and corrosion. PM

Order Direct from Mill — and Save — on Your Choice of 1,000's of Different Die-Formed

STEEL REPLACEMENT PANELS

To Repair Rust or Collision Damage

Available for these American-made vehicles:

PICK-UPS—
Ford 53-79, Bronco 66-79, Chev. & GMC 46-80, Blazer 67-80, Dodge 56-80, Willys Jeep S/W 46-63

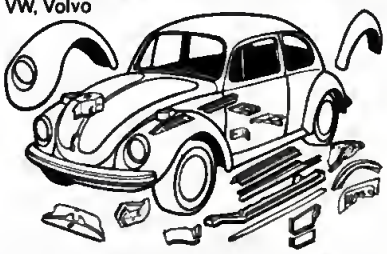
VANS—
Chev. & GMC 63-80, Ford 61-74, Dodge 64-80

FULL SIZE CARS—
Chev. 49-66 & 68, Camaro 67-80, Nove 60-64 & 68-80, Vega 74-77, Ford 49-65 & 68-70, Falcon 60-65, Pinto 71-77, T-Bird 58-60, Torino 68-69, Musteng 64-70, Maverick 69-77

Camaro **Mustang**

Available for these foreign cars:

Alfa-Romeo, Audi, Austin, BMW, Datsun, Fiat, Ford Capri, Ford Fiesta, Honda Civic, Jeguar, Mazda, Mercedas, MG, Opel, Peugeot, Renault, Saab, Toyota, Triumph, VW, Volvo



20-PAGE TABCO CATALOG of Foreign Car sheet metal (without order): $2.00

60-PAGE MILL CATALOG of U. S. Vehicle sheet metal (without order): $3.00

Allow 3 to 6 weeks for catalog delivery, or add $1 for quicker delivery. From Canada, please add (U.S.) $1 for catalog postage. We accept VISA or MASTER CARD for panel purchases (but not for cataloge). Sorry, no C.O.D.'s.
Cell or send self-addressed, stamped long envelope for FREE information on any ONE car or truck listed.

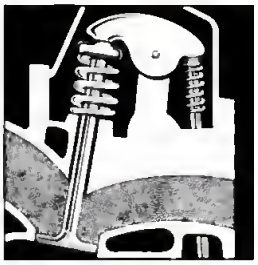
Dept. PM-210 **Mill Supply**

Auto Supply Division • 3241 Superior Ave. Cleveland, OH 44114 • Phone: (216) 241-5072

A car with import fuel efficiency and American car luxury is probably sitting in your driveway.

Convert your own gas-guzzling V-8 into a fuel-efficient V-6 or V-4.

You Can Install THE ECONOMIZER In An Afternoon.



The kit is relatively easy to install yourself or by your local mechanic. It consists of specially designed push rods that fit your particular engine. These rods when installed will deactivate the valves on those extra cylinders thereby making your V-8 on economy 4 or 6. You could then expect o gas mileage goin of up to 40%.

The Economizer is based on a tried and proven way to inexpensively cut gas usage. In fact, cylinder deactivation was first used in 1918.

Start today to have your cake and eat it too with The Economizer Cylinder Deactivation Kit. When ordering be sure to specify make, year and model of car.

COMPLETE KIT ONLY $54.95 (prepaid)

THE ECONOMIZER
RESULTS CONFIRMED BY INDEPENDENT LABORATORY TEST

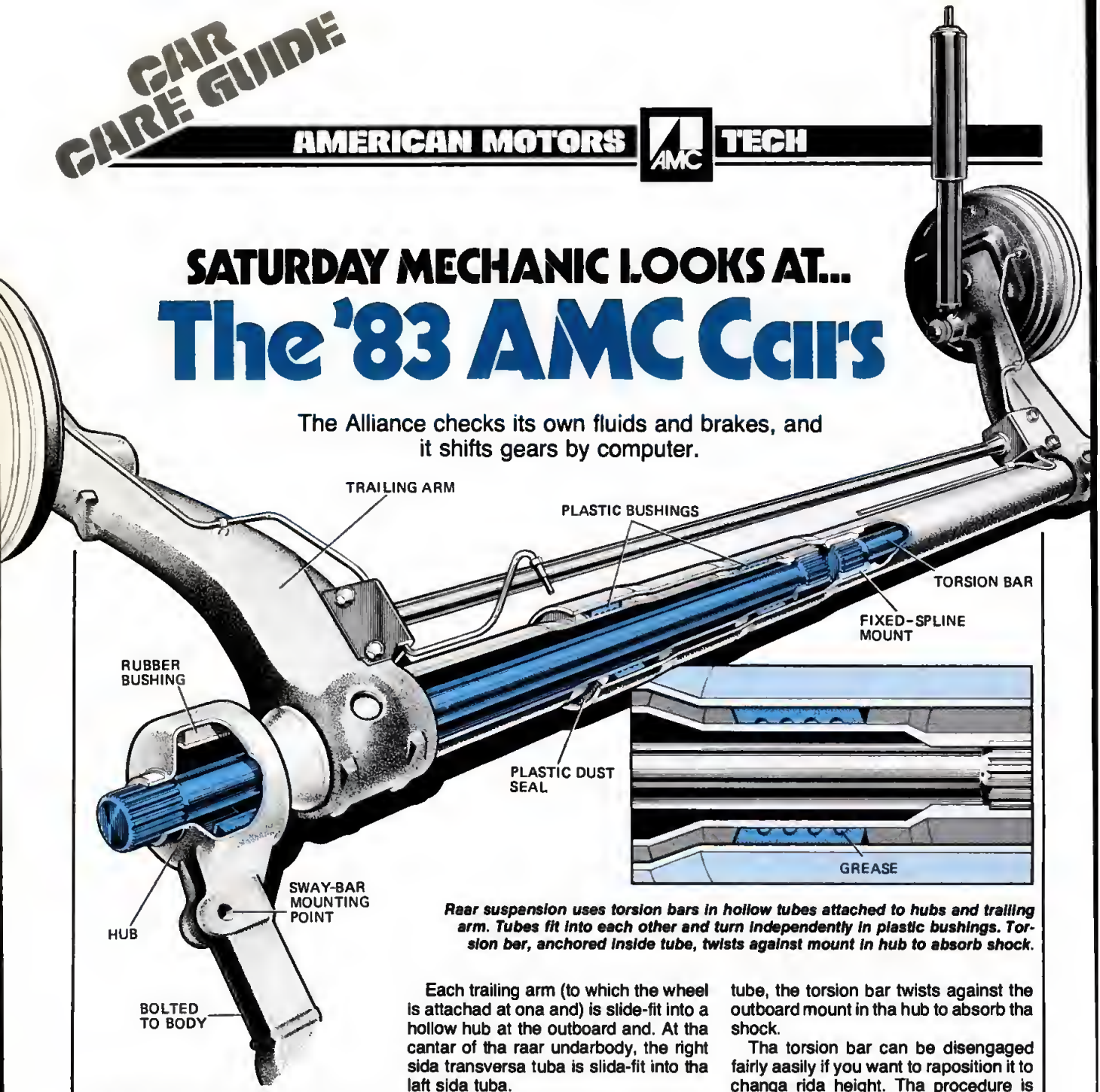
GAS SAVERS INTERNATIONAL
P.O. Box 50593 • Nashville, TN 37205
Yes! Please send me _____ ECONOMIZER Cylinder Deactivation Kits prepaid with written 90 day satisfaction or money back guarantee

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
MODEL _____ YEAR _____ MAKE _____
ENGINE SIZE (C.I.D.) _____ (351) Ford specify W, M or C _____
☐ MasterCard CARD NO. _____
☐ VISA EXP DATE _____
☐ PERSONAL CHECK ☐ CASHIER'S CHECK ☐ MONEY ORDER
Not available for International, American Motors or Foreign.
Tenn. Residents add tax.

SATURDAY MECHANIC LOOKS AT...

The '83 AMC Cars

The Alliance checks its own fluids and brakes, and it shifts gears by computer.



Raar suspension uses torsion bars in hollow tubes attached to hubs and trailing arm. Tubes fit into each other and turn independently in plastic bushings. Torsion bar, anchored inside tube, twists against mount in hub to absorb shock.

The technology news from AMC this year isn't really from AMC, but from its French partner, the Regie Nationale des Usinas Renault. It's tha new Alliance. Designed in Franca and built in Kanosha, Wis., this automobila simply abounds with tachnical sophistication.

Rear axle

Tha raar suspansion is fully indapandant and usas torsion bars that are cleveriy installed inside hollow tubing that is part of the suspension systam. Tha result is a supercompact layout that laavas all kinds of axtra room in tha raar for luggage and passangars.

Each trailing arm (to which the wheel is attachad at ona and) is slide-fit into a hollow hub at the outboard and. At tha cantar of tha raar undarbody, the right sida transversa tuba is slida-fit into tha laft sida tuba.

Plastic bushings that hava groovas to hold grease are installed to separate the tubes slightly and permit one to turn fraaly as wall as independantly whanever a wheel hits any kind of road irregularity.

Thera is a torsion bar for aach trailing arm tube, of course, and it is splinad at both ands. Ona and is anchored in tha outboard sida in the hub, which is bolted to tha undarbody. Tha othar and is hald in a mount in tha inboard end of tha trailing arm tube.

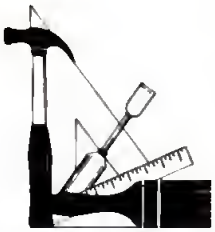
Whan a wheel bounces, tha trailing arm goes up or down and tha transvarsa tuba turns. Bacause the inboard end of tha torsion bar is anchored insida tha tube, the torsion bar twists against the outboard mount in tha hub to absorb tha shock.

Tha torsion bar can be disengaged fairly aasily if you want to raposition it to changa rida height. Tha procedure is similar to that used on Japanase cars with transverse torsion bars, such as Subaru.

Sway bars

The Alliance raar suspension includas a sway bar. Thara's also a sway bar in front, so tha Alliance has more roll rasistance than you'd normally axpect in a European car, and tha suspension is a Franch dasign picked up from tha Renault 9, tha European version of the Alliance. Even the Renault 9 spring ratas and suspansion traval ara retained in tha Allianca. However, the shocks wara recalibratad to tune the suspen-

(Please turn to page 172)

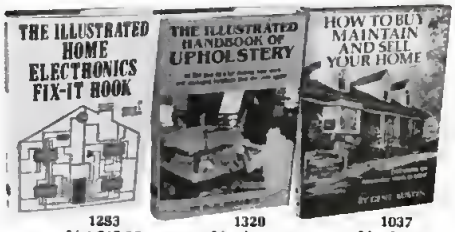


HOW-TO BOOK CLUB

shows you hundreds of ways to do-it-yourself, do-it-right, and save money too!

1178 List $9.95 | 1215 List $10.95 | 1114 List $14.95

Select 5 exceptional books for only $2.95 (values to $107.70)



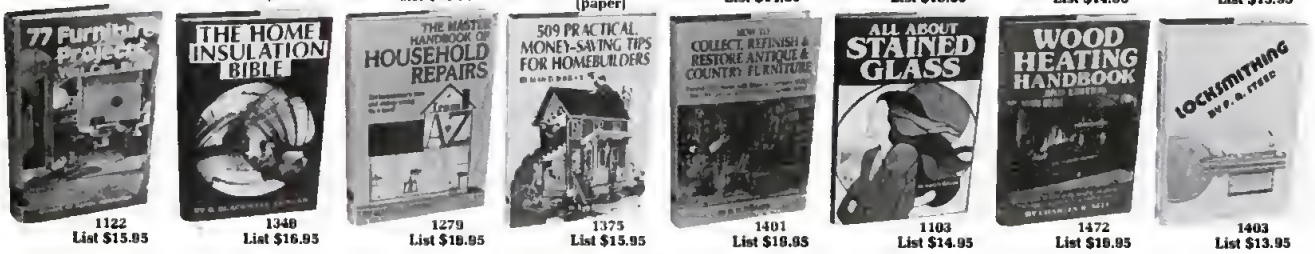
1283 List $18.95 | 1320 List $17.95 | 1037 List $14.95

PLUS *How To Make Your Own Alcohol Fuels* FREE!

"The bestselling alcohol fuels book in the country!"

1287 List $18.95 | 1294 List $10.95 | 1226 List $15.95 | 1316 List $16.95 | 1411 List $15.95 | 1277 List $18.95 | 1002 List $14.95 | 1374 List $19.95

2097 List $18.95 | 1382 List $16.95 | 1365 List $16.95 | 1247 List $10.95 (paper) | 1270 List $14.95 | 1384 List $18.95 | 1211 List $14.95 | 1172 List $15.95



1122 List $15.95 | 1348 List $16.95 | 1279 List $18.95 | 1375 List $15.95 | 1401 List $18.95 | 1103 List $14.95 | 1472 List $18.95 | 1403 List $13.95

7 very good reasons to try How-To Book Club

Blue Ridge Summit, PA 17214

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with dozens of up-to-the-minute titles you can pick from
- **"Automatic Order."** Do nothing, and the Main selection will be shipped automatically! But . . . if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling membership obligation, and qualify for discounts on many other volumes
- **Bonus Specials.** Take advantage of sales, events, and added-value promotions
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with useful, up-to-the-minute information

HOW-TO BOOK CLUB

Blue Ridge Summit, PA 17214

Please accept my membership in How-To Book Club and send the 5 volumes circled below, plus my free copy of "How To Make Your Own Alcohol Fuels," billing me at $2.95 plus shipping and handling charges. If not satisfied, I may return the books within ten days without obligation and have my membership cancelled. I agree to purchase 4 or more books at reduced Club prices (plus shipping/handling) during the next 12 months, and may resign any time thereafter.

1002 1037 1103 1114 1122 1172 1178
1211 1215 1226 1247 1270 1277 1279 1283
1287 1294 1316 1328 1348 1365 1374
1375 1382 1384 1401 1403 1411 1472 2097

Name _____ Phone _____

Address _____

City _____

State _____ Zip _____

(Valid for new members only. Foreign and Canada add 20%. Orders outside U.S. or Canada must be prepaid with international money orders in U.S. dollars.)

This order subject to acceptance by How-To Book Club PM-1062

"IT'S NEW AND IT'S FREE!"
The most complete Published Car Stereo Catalog From
California Sound
"America's Car Stereo Experts"
- 70 pages of Car Stereos and Accessories by Concord Pioneer, Craig, Sanyo, Jensen, ADS and Linear Power.
- Installation info & Specs • Free delivery
- How to design your system
- 5-year Warranty on all Car Stereo items.

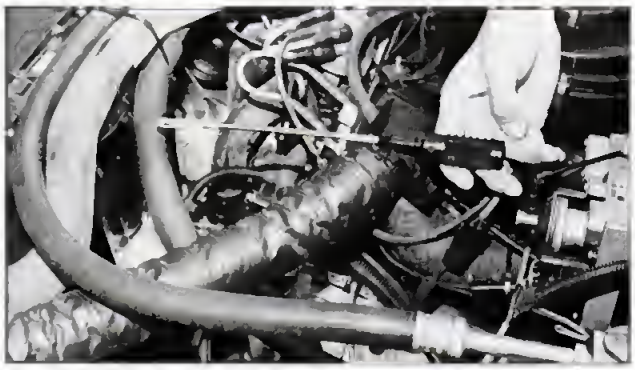
Our responsibility begins when we deliver.
Send to: CA Sound Dept. PM
P.O. Box A82088 San Diego CA 92138
Call Toll Free U.S. 1-800-854-2273
Toll Free CA 1-800-542-6228

THE SOURCE.

The 1983 Woodcraft® Catalog & Supplement
Imitated but never equaled. For 19 years our catalogs have brought the finest tools in the world to American carvers, cabinetmakers, wood turners, and other discriminating craftsmen. Fully illustrated with hundreds of new, useful and decorative items for home and shop. Color, 128 pages, perfect bound. $2.50 for two-year subscription (including supplements).
Send check or money order, with return address, to:
WOODCRAFT®
41 Atlantic Avenue, Box 4000
Dept. PM102 • Woburn, MA 01888

3-Wheeling to Independence!

One Hand Operation—Rear Differential Drive
CYCLE-CHAIR, the NEW ALUMINUM ELECTRIC BIKE that is *different* and *safer*. It's so *easy* to handle, you control on, off, forward, reverse, speed, steering, and braking with just ONE HAND!
Use CYCLE-CHAIR indoors as well as outdoors. Climb steep hills and ramps, travel to the store, or take it to the bank. Be independent on the Cadillac of 3-wheelers. Its low center of gravity and all-aluminum frame makes CYCLE-CHAIR the lightest, strongest, safest 3-wheeler on the market today. Costs only pennies to recharge at home.
Send for free booklet and special offer on CYCLE-CHAIR, PEDALPOWER electric bike motors and pedal tricycles or call toll-free 1-800-257-7955, in N.J. 800-232-6550.
30 Day Trial • Money Back Guarantee
GENERAL ENGINES CO., Dept. 693
591 Mantua Blvd., Sewell, New Jersey 08080


Automatic transexle fluid sensor (left) uses modified dipstick that works by resistence chenge in electrified tip. Resistance of tip immersed in fluid differs from that whan fluid level falls below tip. Other fluid-level sensors (below) are e float-type built into reservoir cap.

sion for the American market; they're more compliant.

Computerized tranny

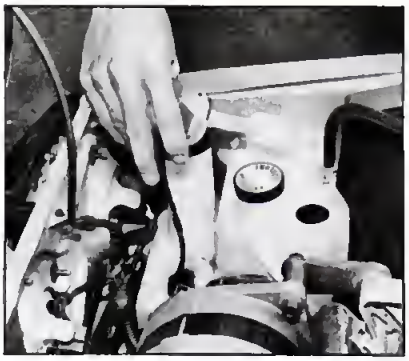
Like many other cers, the Alliance uses e computer to control the fuel injection system, engine idle speed and some emission controls.

However, it also will have a Renault exclusive: computer shifting of the three-speed eutomatic transmission, a function that was pioneered in the Reneult 18.

The transmission's hydraulic velve body contains solenoids that operate ball valves in the oil passages. These solenoids are triggered by the computer to force upshifts and downshifts.

The computer makes the shifting decisions by relying on the same information that a conventionel all-hydraulic valve body does—throttle position and road speed.

However, instead of a mechanical linkege or a vacuum hose to the throttle body, there's a throttle position sensor—in essence a varieble resistor thet provides an electrical signal the computer can interpret. A miniature alternator



generates current proportional to roadspeed.

System Sentry takes three seconds to report on all vehicle fluids, except fuel; also condition of front brake linings.

Monotrace seats

Like power seats but not the price? The Alliance has a less expensive alternative, e manual seat with six-way adjustment. It's called Monotrace seats. There's the usual fore-aft adjustment plus full seat-back rake that edjusts from vertical to recline. But, there's also something new—a fore-aft tilt along a curved seat track.

For many people, the power seat's combination of up-down and tilt is what makes one car fit a short wife and tell husband.

However, when you move the new Alliance seat through a tilt, the top of the back angles to the rear and the front ot the seat moves up. This accommodates the taller driver.

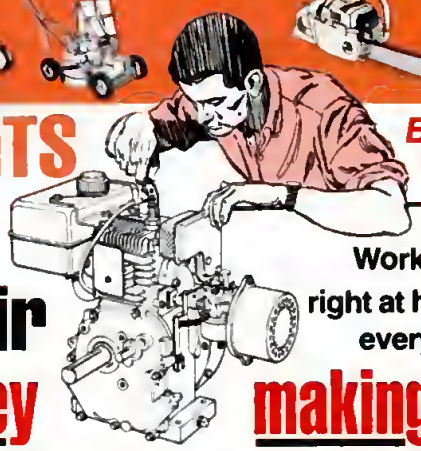
This isn't as good as the power seat's infinite range of up-down plus tilt, but it's free—standard equipment on all but the base Alliance and it might even become stendard on the base model by mid-yeer.

Door-lock zapper

That's no ordinary key fob that comes with the Alliance. The special fob, part of a system called Infrawave Entry, actual-

(Please turn to page 176)

Get in on the PROFITS in SMALL ENGINE service and repair



BEAT INFLATION!
Cash in on the huge demand for small engine repair.

Work part time, full time right at home - we help you every step of the way.

Start your own money making business!

In just a short time, you can be ready to join one of the fastest growing industries in America... an industry where qualified men are making from $10.00 to $15.00 per hour... and that's just for labor. Parts, engines and accessories add even more to the profits.

Because the small engine industry has grown so quickly, an acute shortage of qualified Small Engine Professionals exists throughout the country. In fact, it's not unusual for a good small engine man to be three to four weeks behind in the summer and at least a week behind in the winter. When you see how many small engines are in use today, it's easy to understand why qualified men command such high prices—as much as $17.50 for a simple tune-up that takes less than an hour!

65-million small engines are in service today!

That's right — there are over sixty-five million 2-cycle and 4-cycle small engines in service across the U.S.A. That's the official count from the Engine Service Assn., and new engines are being built at a rate of one-million per month! With fully accredited and approved Foley-Belsaw training, you can soon have the skill and knowledge to make top money servicing these engines. Homeowners and businessmen will seek you out and pay you well to service and repair their lawnmowers, tillers, edgers, power rakes, garden tractors, chain saws, mini-bikes, go-carts, snowmobiles, generators, snowblowers, paint sprayers... the list is almost endless.

No experience necessary.

You don't need to be a 'born mechanic' or have prior experience. If you can read, you can master this profitable trade right at home, in your sparetime, without missing a single paycheck. Lessons are fully illustrated—so clear you can't go wrong.

You receive trade secrets and business plans.

We guide you every step of the way, including tested and proven instructions on how to get business, what to charge, how to get free advertising, where to get supplies wholesale... all the "tricks of the trade"... all the inside facts you need to assure success right from the start.

Increased Income

"I've had about 8 years experience repairing small engines... but repairs were only minor... until I started the Foley-Belsaw Course."

Walter H. Strick
Campbell, California

With our famous 'learn-by-doing' training method, you get practical 'hands-on' experience with specialized tools and equipment that you'll receive with your training *plus* a brand-new 4 HP engine—*all yours to keep!*

SEND FOR FREE FACTS!

You risk nothing by accepting this offer to find out how Foley-Belsaw training can give you the skills you need to increase your income in a high-profit, recession-proof business of your own.

Just fill in and mail coupon below (or send postcard) to receive full information and details by return mail. *DO IT TODAY!*

Send TODAY for this fact-filled FREE BOOKLET!

Tells how you quickly train to be your own boss in a profitable Sparetime or Fulltime business of your own PLUS complete details on our 10-Day NO RISK Trial Offer!

FOLEY-BELSAW INSTITUTE of SMALL ENGINE REPAIR
50001 Field Bldg., Kansas City, MO. 64111

There is NO OBLIGATION and NO SALESMAN Will Call—ever!

FOLEY-BELSAW INSTITUTE, 50001 FIELD BUILDING
KANSAS CITY, MISSOURI 64111

☐ **YES,** please send me the FREE booklet that gives full details about starting my own business in Small Engine Repair. I understand there is no obligation and that no salesman will call.

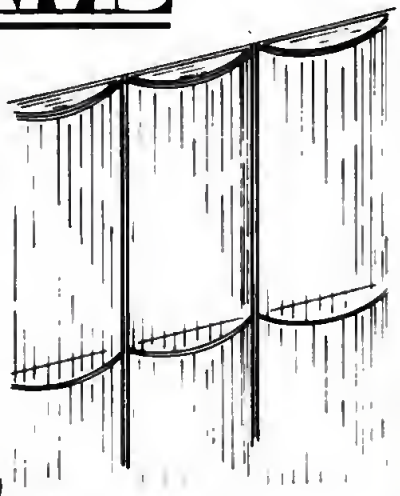
Name _____

Address _____

City _____

State _____ Zip _____

INTRODUCING
SUNFORMS INC.



...a new system for the effective, efficient and attractive creation of sunspaces.

Use your own imagination to alter or create the sunspace you want with our new and unique **Sunshells.**

Sunshells are attractive, double-walled polycarbonate units which snap together, simply and easily. They are shatterproof, transparent and light-weight.

Remember Grandma's sun-room? It was the warmest place in the house.

Let us help you re-create this glorious warmth—on your patio, porch or breeze-way.

We believe we know what you are looking for. And we believe we have it!

And the prices are very right! (Less than $6.50 per square foot of double-walled area, including interlocking verticals and end caps.)

Send for your free brochure about SUNFORMS' unique **Sunshells.**
Or, if you are really serious about creating your own sunspace, send $2.50 for our **Master Guide to Sunspace—With SUNFORMS.**

Mail today! And when you order **Sunshells**, we will be able to deliver in time for you to convert this season!

SUNFORMS INC.
133 West 21st Street
New York, N.Y. 10011

Name &
Address

☐ **Send me free brochure.**
☐ **Enclosed is $2.50 check or money order for Master Guide.** **PM-2**

BUTTON-UP! CUT FUEL COSTS! SAVE ENERGY!

you can do it *faster, cheaper, better . . .* with a
one hand operated
ARROW T-50
HEAVY DUTY
STAPLE GUN

You'll save up to 30% on fuel bills when you insulate and weatherstrip your house with an Arrow T-50 Staple Gun. You save your own energy, too — as well as labor costs! It's a breeze — one hand does it . . . one SQUEEZE and you've nailed it!

Just position gun, squeeze handle and presto . . . staple is driven into exact spot desired in 1/10th the time it takes to hammer a nail! Your other hand is always free to hold material in place for a neat, professional job!

Arrow Staple Guns come in a variety of models.

At all leading Hardware, Home Center & Discount Department Stores Everywhere.

ARROW FASTENER COMPANY, INC., 271 Mayhill Street, Saddle Brook, N. J. 07662

ly is an optional battery-powered, infrared light transmitter that triggers a sensor on the car's dashboard. The sensor then signals a relay to operate the power door lock solenoids.

There are 50,000 possible infrared light signals that can be generated with this system, so there's no reason to worry about your fob popping open every Alliance on the block.

Infrawave entry system opens door locks with an infrared light instead of a key.

Smart idiot lights

At a time when other carmakers are offering dashboard monitors that talk to you, the AMC Renault Alliance's System Sentry will be doing what the others cannot: measuring and reporting on fluid levels in the engine, transmission cooling system, power steering and master-cylinder reservoirs. It also tells if the front brake linings are worn out, and checks the fluid level of your window washer.

Monotrace-seat mounts offer a six-way manual adjustment, including fore-aft tilt, to accommodate riders of all sizes.

When you shut off the engine, a "checking" light goes on in the panel to tell you the monitor is taking readings. After three seconds, the other display lights go on, green if a fluid level or brake lining is good, red if it's not. After nine seconds, the Sentry shuts down.

The Sentry has no microprocessor, but it does contain 15 integrated circuits and it has memory. **PM**

Know your car inside and out.

Know how to fix it... to tune it... to service it... to keep it running right. The TOTAL SERVICE MANUAL for your car will show you how to do everything from a minor adjustment to a major repair.

TOTAL SERVICE MANUALS are digests of official factory workshop manuals. Each one is carefully rewritten for use by the do-it-yourself car owner. Clear and easy to follow, yet complete and detailed enough even for professional use. You get all the important information plus hundreds of the best pictures, diagrams, and specifications.

TOTAL SERVICE MANUALS

SATISFACTION GUARANTEED OR YOUR MONEY BACK

1713	ALFA ROMEO 62-78 for all Guilia GT & Spider models	$12.95
9641	ALFA ROMEO ALFETTA 73-79 covers all models	$12.95
8677	AMC GREMLIN, NORNET, PACER 71-80 for all models	$11.95
0991	ARROW, PLYMOUTH 76-80 covers all models	$11.95
2497	ARROW PICK UP for all models inc 0-50	$10.95
9404	ASPEN, DODGE 75-79 covers all models	$11.95
7122	AUDI 100 70-77 for all models inc 100L	$11.95
9590	AUDI 4000 79-81 covers all models	$10.95
0664	AUDI 5000 77-79	$11.95
0726	AUDI FOX 73-79 covers all models	$11.95
0916	AUSTIN AMERICA 68-71 covers all modals inc 1100 1300	$11.95
1203	AUSTIN HEALET 100/6, 3000 56-68 for all models	$11.95
0379	BARRACUDA & 'CUDA 65-72 all 5 & V8 models	$10.95
8154	BLAZER, CHEVY 67-79 all mdls plus Suburban & GMC Jimmy	$11.95
1042	BMW 2002 59-77 inc 1500 1600, 1602, 2000 except CS	$11.95
9813	BMW 320i 77-81 covers all models	$11.95
9326	BMW 75-79 inc 528i 530i 630i 630CSi,633CSi,733i models	$11.95
9760	BMW 2500, 2800, 3.0 all mdls inc Bavaria & CS	$12.95
0504	BRONCO, FORD 65-81 for all 2 & 4 whl drive models	$10.95
6308	BUICK 60-76 inc Electra, Le Sabre, Riviera, Wildcat	$12.95
8082	BUICK REGAL & CENTURY 74-80 for all mdls inc turbo	$11.95
0727	CADILLAC 68-74 all models except El Dorado	$12.95
8678	CAMARO 67-81 covers all 6 & 8 cylinder models	$11.95
9557	CAPRI 70-76 for all 2000 2600 2800 mdls	$11.95
8021	CAPRI 79-82 covers all models and engines	$11.95
0379	CHALLENGER 70-72 covers all 6 and V8 mdls	$10.95
8446	CHAMP & SAPPORO 77-81 covers all engines & models	$11.95
8331	CHARGER 67-70 for all models inc 500 & R/T	$10.95
8212	CHARGER 71-75 covers all models	$10.95
9851	CHEVROLET CAVALIER 82 all mdls + Cimarron & J2000	$10.95
0383	CHEVELLE 64-81 inc Malibu, Monte Carlo, El Camino	$10.95
0838	CHEVETTE 76-81 covers all models	$11.95
1038	CHEVROLET 29-40 covers all 6-cyl models	$18.00
0888	CHEVROLET 49-54 reprint of factory shop manual	$20.00
1001	CHEVROLET 55-65 for all Bel Air, Biscayne, Impala mdls	$12.95
0870	CHEVROLET 68-81 for Bel Air, Biscayne, Caprice, Impala	$10.95
9148	CHEVROLET CITATION 80-81 also mdls plus Buick Skylark	$10.95
0884	CHEVROLET MONZA 75-80 all mdls plus Buick Skyhawk	$10.95
8107	CHEVT II 62-68 covers all 4, 5 & V8 models	$10.95
0779	CHEVY LUV 72-81 covers all models	$11.95
0924	CHEVY PICK UP 67-81 all mdls inc Suburban & GMC	$11.95
1682	CHEVY VANS 67-81 covers all models plus GMC	$11.95
0020	CHRYSLER 72-79 factory manual must give year	$23.95
9588	CITROEN IO, DS 67-75 covers all DS19 20 21 mdls	$12.95
8264	COLT & CHALLENGER 71-81 covers all models	$11.95
8211	COMET 71-79 covers all models	$10.95
8212	CORONET, DODGE 71-75 covers all models	$10.95
0478	CORVETTE 57-65 covers all 283 & 327 models	$11.95
9481	CORVETTE 66-82 covers all models & engines	$12.95
1756	CRICKET, PLTMOUTH 70-73 also covers Hillman Avenger	$11.95
8188	DART & DEMON 68-76 covers all models	$10.95
9592	DATSUN 200SX 1980	$11.95
8065	DATSUN 1200 & B210 71-78 covers all models	$11.95
0783	DATSUN 210 79-80 covers all models imported	$11.95
8127	DATSUN 240Z, 260Z, 280Z 70-78 covers all models	$11.95
9152	DATSUN 280ZX 79-81 for all models	$11.95
1657	DATSUN 310 76-81 covers all models plus F-10	$11.95
1551	DATSUN 510 68-73 covers all sdn & wagon mdls	$11.95
1074	DATSUN 510 70-79 covers all models	$11.95
9583	DATSUN 610,710 68-77 covers all models	$11.95
8271	DATSUN 810 77-80 covers all models imported	$11.95
1258	DATSUN 311 sports car 1600/2000 SPL & SRL mdls	$20.95
9297	DATSUN PICK-UP 70-81 for all 2-whl dr models	$11.95
0925	DATSUN PICK-UP 80-81 for all 4-whl dr models	$11.95
0871	DODGE 68-77 for all Monaco & Polara models	$10.95
8066	DODGE ARIES 81-82 covers all models	$11.95
1259	DODGE OMNI 78-81 covers all models inc 0/24	$11.95
8371	DODGE PICK-UPS 65-78 covers all 4-whl dr models	$10.95
1298	DODGE PICK-UP 71-81 for all 2-whl drive models	$11.95
8203	DODGE VANS 67-70 all ½, ¾ & 1 ton mdls inc Plymouth	$10.95
6070	DODGE VANS 71-81 covers all models to 1 ton plus Plymouth	$11.95
8192	DUSTER 70-76 for all models inc Scamp	$10.95
0178	ESCORT, FORD 80-81 covers all models	$11.95
8189	FAIRLANE, FORD 62-70 covers all models	$10.95
8366	FAIRMONT,FORD 78-81 covers all models and engines	$11.95
9874	FALCON, FORD 6 64-70 covers all 6-cyl models	$10.95
9776	FIAT 124 67-81 all inc spyder,coupe & 2000	$11.95
9640	FIAT 128 72-79 for all models inc SL & Rally	$11.95
8742	FIAT 131 75-77 covers all models	$11.95
8106	FIAT 131 78-80 covers all models	$11.95
1201	FIAT 850 64-74 all sedan coupe & spider mdls	$11.95
0399	FIAT X1/9 73-80 covers all models	$11.95
6022	FIAT STRADA 79-80	$11.95
1073	FIESTA, FORD 77-79 for all models	$11.95
0675	FIREBIRD 67-69 covers all models	$11.95
6309	FIREBIRD 70-81 covers all models inc Trans Am	$11.95
9611	FORD 71-78 inc LTD II, Ranchero, Thunderbird	$10.95
0072	FORD 68-81 for Custom,Galaxie,LTD, XL & wagon mdls	$10.95
9369	FORD COURIER 72-81 covers all models imported	$11.95
8205	FORD PICK-UP 65-88 all 2 & 4-whl dr mdls 1/2-1 ton	$10.95
0451	FORD PICK UP 69-81 covers all models	$10.95
8204	FORD VANS 61-68 for all ½ ¾ & 1 ton models	$10.95
0453	FORD VANS 69-81 covers all 6 & 8 cylinder models	$11.95
9436	GRANADA, FORD 75-80 covers all models	$10.95
0644	HONDA 360, 600, 57-75 for all models inc Z	$11.95
0885	HONDA ACCORD 77-80 covers all models	$11.95
8894	HONDA CIVIC, 73-79 covers all models inc CVCC	$10.95
0980	HONDA CIVIC 80-81 covers all models	$11.95
9787	HONDA PRELUDE 79-80 complete coverage	$11.95
8206	INTERNATIONAL SCOUT 67-73 800 A & II mdls	$10.95
8565	INTERNATIONAL 62-80 tune/maintain Scout wagon pick-up	$10.95
1206	JAGUAR 55-69 sedan mdls 2.4 3.4 3.8 240 340	$11.95
1043	JAGUAR E-TYPE 61-72 covers all 6-cylinder models	$12.95
9612	JAGUAR E-TYPE V12 71-74 covers all models	$11.95
9399	JAGUAR XJ6 68-78 covers all models	$12.95
9617	JAGUAR XJ12 72-79 for all models inc XJS Daimler	$12.95
9769	JEEP 50-65 for 4 & 6 cyl station	$19.95
8207	JEEP 66-79 for all Cherokee Commando & Wagoneer mdls	$10.95
9805	JEEP WAGONEER J-series with 230 ohc eng	$19.95
9806	JEEP UNIVERSAL CJ-2, CJ-3 reprint factory manual	$19.95
0509	JEEP 55-81 for all CJ-5 CJ-6 CJ-7 Scrambler mdls	$10.95
8739	JENSEN-HEALET reprint of factory manual	$24.95
0596	LANCIA BETA 76-80 for sedan coupe & HPE models	$11.95
1254	LANDROVER 59-77 covers 2 2A 3 gas & diesel models	$11.95
0574	LOTUS ELAN 62-74 covers all models inc Plus 2	$19.95
0481	MAVERICK 69-71 6 cyl 170 200 250 cu in eng	$10.95
8211	MAVERICK 72-77 covers all models	$11.95
1550	MAZDA GLC 77-80 covers all models	$11.95
0370	MAZDA RX2 70-75 covers sedan & coupe mdls	$11.95
0371	MAZDA RX 3 72-78 covers all models	$11.95
0444	MAZDA 71-78 includes RX4 and Cosmo models	$10.95
9941	MAZDA GX7 79-80 covers all models	$11.95
0080	MAZDA PICK-UP 72-75 B-1600 & rotary eng mdls	$10.95
8105	MAZDA 626 79-81 covers all models	$11.95
0593	MAZDA 808, 818 72-78 covers all models	$11.95
0573	MAZDA 1500, 1800 67-74 covers all models	$11.95
0781	MERCEDES-BENZ 190SL reprint of owner's manual	$11.95
1746	MERCEDES-BENZ 220 59-65 covers all mdls	$12.95
9483	MERCEDES-BENZ 220 68-72 mdls except Diesel	$12.95
1747	MERCEDES-BENZ 230 63-68 inc 230S & SL	$12.95
8197	MERCEDES-BENZ 250 65-68 plus 1900,2000,2200 diesels	$10.95
9485	MERCEDES-BENZ 250,280 68-72 all models plus 230	$12.95
0416	MERCEDES-BENZ 68-73 inc 280 300 & 350 450 V8 mdls	$11.95
8439	MERCEDES-BENZ 74-79 Covers all models inc Diesels	$11.95
9435	MERCURY MONARCH 75-80 covers all models	$10.95
0710	MERCURY ZEPHYR 78-81 all models inc turbocharged	$11.95
1105	MG TA, TB, TC, TD, TF 36-55	$12.95
1098	MG MIDGET 58-78 covers all models	$11.95
1106	MGA MGB 55-68 covers all models inc twin cam	$12.95
1720	MGB,MGB GT 69-79 for all roadster & coupe models	$12.95
8396	MGC reprint of factory manual	$24.95
0917	MINI 59-78 covers all models inc Mini-Cooper	$11.95
0884	MONZA, CHEVROLET 75-80 plus Astre Starfire Skyhawk	$10.95
9876	MUSTANG I 65-72 covers all 5-cylinder models	$11.95
0479	MUSTANG V8 65-73 covers all models	$11.95
8272	MUSTANG II 74-78 covers all 4 V6 & V8 models	$11.95
9386	MUSTANG 79-82 covers all engines and models	$11.95
0951	NOVA, CHEVROLET 71-79 covers all models	$11.95
7107	OLDS CUTLASS 70-81 covers all models & engines	$11.95
9140	OLDS OMEGA 80-81 all mdls plus Pontiac Phoenix	$10.95
0884	OLDS STARFIRE 75-80 all mdls plus Pontiac Astre	$10.95
5308	OLDSMOBILE 68-76 covers all 88 and 98 models	$12.95
1724	OPEL KADETT 62-73 1000, 1100 1200 models	$12.95
8273	OPEL 66-79 for all models inc 1900 Manta & Isuzu	$11.95
9589	OPEL GT 68-73 covers all 1900 models	$12.95
0711	PEUGEOT 504 DIESEL 74-80 covers all models	$11.95
7124	PEUGEOT 504 68-79 for all gasoline engine models	$11.95
0883	PINTO 70-80 covers all models inc Mercury Bobcat	$10.95
0874	PLYMOUTH 68-76 Fury, VIP Gran Suburban models	$10.95
1259	PLYMOUTH HORIZON 70-81 covers all models inc TC3	$11.95
8066	PLYMOUTH RELIANT 81-82 covers all models	$11.95
0851	PONTIAC 66-76 all full size inc Bonneville Catalina GP	$12.95
0489	PONTIAC TEMPEST 68-73 all mdls inc GTO Le Mans	$10.95
1650	PORSCHE 356 57-65 covers A, B & C models	$12.95
1591	PORSCHE 911 64-73 covers all models	$12.95
8173	PORSCHE 911 74-77 includes H S Targa Carrera	$12.95
1590	PORSCHE 912 65-69 with 1582cc engine	$12.95
9834	PORSCHE 914 70-75 all models inc 914/6	$11.95
0993	PORSCHE 924 75-80 covers all models inc Turbo	$11.95
8008	PORSCHE 928 78-81	$11.95
0372	RENAULT Le Car 72-81 for all models inc R5	$11.95
1224	RENAULT 8, 10 62-72 covers all models inc 1100	$11.95
9429	RENAULT 12 69-79 covers all models inc auto trans	$12.95
0645	RENAULT 15, 17 71-78 all mdls inc TL, TS	$12.95
1554	RENAULT 16 65-78 covers all models	$12.95
0395	ROADRUNNER & SATELLITE 68-73 all models	$10.95
0750	SAAB 99 69-79 covers all models	$11.95
8440	SAAB 67-79 covers all models inc Sonnet	$11.95
1098	SPRITE 58-71 covers all Mk 1 2, 3 & 4 models	$11.95
8058	SUBARU 72-81 for all models inc Brat	$11.95
0845	SUNBEAM TIGER reprint of factory shop manual	$24.95
0489	TEMPEST, GTO, LE MANS 68-73 all models	$10.95
8189	TORINO 60-75 all models inc Elite, Ranchero	$10.95
0829	TOYOTA CELICA 71-80 covers all models	$11.95
9812	TOYOTA COROLLA 68-81 for all models inc 5 spd trans	$11.95
7132	TOYOTA CORONA 70-00 covers all 4-cyl models	$11.95
0754	TOYOTA CORONA Mk 2 72-76 for all 6 cylinder models	$11.95
0647	TOYOTA PICK UP 68-01 for all 2 whl drive models	$11.95
8524	TOYOTA LAND CRUISER 66-77 covers all models	$11.95
0923	TOYOTA STARLET 78-81 covers all models	$11.95
0901	TOYOTA TERCEL 79-01	$11.95
1200	TRIUMPH SPITFIRE 62-78 covers all models	$11.95
1015	TRIUMPH TR5, TR6, 67-76 all models inc TR250	$11.95
8693	TRIUMPH TR7 75-80	$11.95
8192	VALIANT 68-76 all mdls inc Scamp Signette	$10.95
0567	VEGA 70-73 covers all models including GT	$10.95
0004	VEGA 74-77 all models inc Monza except Cosworth/Vega	$10.95
0782	VOLARE, PLTMOUTH 76-79 covers all models	$11.95
1227	VOLKSWAGEN BEETLE 54-67 all mdls inc Karmann-Ghia	$11.95
0140	VOLKSWAGEN BEETLE 68-77 all mdls inc Karmann-Ghia	$11.95
0933	VOLKSWAGEN RABBIT SCIROCCO 75-01 all inc diesel	$11.95
1125	VOLKSWAGEN BUS 61-79 all camper van, transporter mdls	$11.95
9582	VOLKSWAGEN TYPE 3 62-73 for squareback fastback	$11.95
5778	VOLKSWAGEN 411, 412 68-74 covers all models	$11.95
8748	VOLKSWAGEN DASHER 74-79 covers all models	$11.95
9444	VOLVO P1800 60-73 all models inc E & ES	$12.95
1754	VOLVO 142, 144, 145 66-74 for all models inc S & E	$11.95
9558	VOLVO 164 68-75 for all models inc fuel injection	$11.95
3729	VOLVO 242, 244, 245 74-02 covers all models	$11.95
8311	VOLVO 264, 265 75-00 covers all models	$11.95

GENERAL REPAIR MANUALS — TUNING GUIDES — HOME REPAIR — TECHNICAL BOOKS

9610	CHILTON AUTO REPAIR 75-82 for all American cars	$17.95
0932	CHILTON AUTO REPAIR 72-79 for all American cars	$19.95
7137	CHILTON AUTO REPAIR 64-71 for all American cars	$19.95
1763	CHILTON AUTO REPAIR 54-63 for all American cars	$19.95
7111	CHILTON TRUCK REPAIR 73-80 American & imported mdls	$19.95
8561	CHILTON TRUCK REPAIR MAN 61-71 for all ¼ 2½ ton mdls	$19.95
9700	CHILTON IMPORT CAR MANUAL 73-81 for ALL major makes	$19.95
0492	AUTO REPAIRS & PRICES flat rate times 74-79 U S cars	$7.95
1146	PERFORMANCE WITH ECONOMY power from tuning & building	$9.95
7125	AUTO AIR CONDITIONING service & repair all	$7.95
8726	TRANSISTOR IGNITION SYSTEMS covers them all	$8.95
1067	MORE MILES PER GALLON GUIDE How to do it good & cheap	$7.95
1197	ALCOHOL DISTILLER'S MANUAL for gasohol & spirits	$12.95
7110	WEEKEND MECHANIC'S HANDBOOK ideal manual for beginner	$9.95
9622	HOW TO TUNE YOUR CAR good for all cars	$5.95
8030	POWER TUNING your car, truck, van or RV	$5.95
8859	GM DIAGNOSIS & REPAIR MANUAL 70-80 for all GM cars	$9.95
9671	BASIC CAR MAINTENANCE & REPAIR good one to start with	$4.95
1712	BASIC AUTO REPAIR MANUAL a must for any car	$5.95
1707	BASIC BODYWORK & PAINTING	$6.95
1711	BASIC CARBURETORS & FUEL SYSTEMS for all U S makes	$6.95
1706	BASIC CHASSIS, SUSPENSION BRAKES tune & service	$6.95
1700	BASIC IGNITION & ELECTRICAL SYSTEMS	$6.95
0680	BASIC AUTO TROUBLESHOOTING for all cars	$6.95
9410	TURBOCHARGERS most complete book on the subject	$9.95
3759	ELECTRONIC FUEL INJ MAN 70-77 for all imported cars	$9.95
9976	CARBURETOR BASICS troubleshoot/rebuild all U S makes	$8.95
9411	HOLLEY carbs all 2 & 4 bbl tune & rebuild	$7.95
9652	ROCHESTER carbs all inc 4MV Quadrajet	$9.95
9666	SOLEX CARBURETORS all 1 & 2 barrel downdraft models	$4.95
6354	SU CARBURETORS tune & rebuild all to 1976	$9.50
9423	STROMBERG CD CARBS tune/rebuild all to 1976	$9.50
1511	WEBER CARBURETORS tune & rebuild all models to 1979	$8.50
0827	AUTOMOTIVE REFINISHING best professional paint book	$8.95
8425	MINOR AUTO BODY REPAIR step by step how to	$7.95
5104	AUTOBODY REPAIRING & REPAINTING the best	$12.95
5106	GLASS FIBER AUTO BODY construction & repair	$6.00
1071	CREATIVE CUSTOMIZING how to do it like a pro	$6.95
3726	ENGINE SWAPPING latest techniques with actual swaps	$8.95
8491	PRACTICAL ENGINE SWAPPING how to do it right	$7.95
6029	DIESEL GUIDE covers everything owner/buyer should know	$8.95
0541	MODERN DIESEL CARS describes all models now sold	$7.95
7128	DIESEL, How to convert your car, van pickup to	$7.95
8432	DIESEL ENGINES, HOW TO REPAIR complete training course	$9.95
1017	AUTOMOBILE ENGINE REBUILDING	$13.75
9320	AUTOMATIC TRANS SERVICE 68-79 all Ford & GM models	$14.95
9780	AUTO RESTORATION GUIDE best ever published 291 pgs	$14.95
0995	CAR INTERIOR RESTORATION useful for all cars	$6.95
0906	OLD CAR VALUE GUIDE latest edition	$9.95
0706	BYPASS EMISSION CONTROLS 73-77 all Ford-built cars	$14.95
8474	BYPASS EMISSION CONTROLS 71-77 GM cars	$13.95
9534	BUICK POWER MANUAL performance tuning the V6 models	$7.95
0931	CHEVY V-6 How-to-handbook for all 78-81 engines	$6.95
0830	CHEVY SUPER SPORT 61-76 everything about every model	$13.95
8421	CHEVROLET RACING ENGINE how to build	$9.95
1243	CHEVY, RACING THE SMALL BLOCK super performance	$7.95
8795	CHEVY PERFORMANCE getting the most from small blocks	$9.95
8125	CHEVY SMALL BLOCK, how to rebuild	$7.95
9409	CHEVY SMALL BLOCK, How to hotrod	$7.95
0949	CORVETTE RESTORATION SOURCE BOOK 53-67 the 'bible'	$21.95
0946	FORD SMALL BLOCK, How to rebuild	$7.95
9497	FORD V-8 how to rebuild 351C 351M 400 429 460 engines	$7.95
9498	PINTO, how to rebuild the 4-cyl	$9.95
8195	FORD PERFORMANCE how to get it for street or track	$9.95
0892	MUSTANG, HOW TO RESTORE YOUR complete how to manual	$14.95
0941	MUSTANG RECOGNITION GDE 500 fotos all mdls, access, etc	$16.95
1766	ENGINE POWER everything from basics to super-tuning	$8.95
8152	BOLT-ON PERFORMANCE what to buy & what it will do	$9.95
0735	SUPERPOWER turbo & supercharging, fuel injtn	$9.95
5117	DESIGN & TUNING COMPETITION ENGINES	$14.95
8441	NOW TO MAKE YOUR CAR HANDLE street/track	$7.95
8658	AIRCOOLED ENGINES MANUAL all 1 & 2-cyl over 15 cid	$9.95
9419	SMALL ENGINE SERVICE MANUAL all 1-cyl under 15 cid	$9.95
0965	SMALL DIESEL ENGINE MANUAL all major makes to 160 cid	$9.95
9770	LAWN MOWER fix all gas powered walking, push type	$8.95
8755	RIDING LAWNMOWER manual for all major makes and models	$8.95
9651	SMALL TRACTOR manual 65-81 all makes/models 8-30 hp	$19.95
0822	FORD FARM TRACTOR manual covers models 2N,8N & 9N	$9.95
1028	IH FARM TRACTORS for A B C H M MTA 4 6 W6TA,9 models	$9.95
9525	MACHINING FUNDAMENTALS to use all machine shop equip	$19.95
9147	EXCAVATOR OPERATION dozers backhoes, loaders, cranes	$9.95
0592	FORK LIFT TRUCKS service overhaul all gas, prop elec	$19.95
9807	HEAVY EQUIPT REPAIR dozers, backhoes cranes plus	$19.95
0039	CATERPILLAR MANUALS for D4 D6 D7,D8 must give model	$19.95
0929	MOTORCYCLE MANUAL 68-81 all Japanese makes + H-D	$24.95
0555	SNOWMOBILE MANUAL covers over 300 models thru 73	$8.95
0557	CHAIN SAW SERVICE MANUAL for top 34 makes	$9.95
8002	DIL BURNERS How to install and service	$9.95
8006	WASHING MACHINES fix all makes & models	$5.95
7109	CLOTHES DRYERS fix all makes and models	$5.95
1268	SEWING MACHINE REPAIR service adjust repair all makes	$8.95
9004	TYPEWRITER REPAIR Covers electric & manual models	$10.95
7133	35mm CAMERA REPAIR all SLR makes and models	$9.95
9959	TV REPAIR Beginners guide for any color B/W problem	$6.95
9447	ELECTRICITY FROM WIND WATER & SUN how to get it	$6.95
0724	LOCKS & LOCKSMITHING complete step-by step course	$9.95
3752	TELEPHONES, Master Handbook every type & installation	$10.95

CARBOOK 16 Glen Ave., MJ Sea Cliff, NY 11579

Name

Address

City

State Zip

Books shipped to all parts USA/Canada (US Dollars)

☐ I enclose full payment phone orders 516-676-8043

Charge ☐ Amer. Express ☐ Visa ☐ Mastercharge

Card # Exp Date

BOOK NO.	QTY	PRICE EACH	TOTAL
		$	$
		$	$
		$	$

PLEASE PRINT NAME AND ADDRESS — postage/handling $3.00 — TOTAL $

•NO COD•

When You Can't Do It Yourself...

Here's how to cope when you need the help of a professional who has time and tools to do the job.

A mechanic concerned about improving his skills earns gear-shaped patch by passing exams formulated by the National Institute for Automotive Service Excellence (NIASE).

Remember the last time you dropped e screw—or was it the screwdriver—down the carburetor throat? Or maybe it was some other dumb thing like tightening a boit en extra querter turn, only to have it strip, snap off or creck the pert you were installing.

Don't feel bad. You're in good company. We don't know many Saturday mechanics who haven't blown at least one repair job and wished they'd let a professional mechanic handle it.

While some beck-yard wrench benders consider the professional a deft-fingered mechenical healer who can unerringly troubleshoot and fix any car-related problem, others don't hold the pro in such high esteem. In fact, some believe there is nothing the pro can do thet they cen't do as well, except perhaps overcharge e customer.

There is good reason for misconceptions about the professional mechanic. Because there is no minimum requirement, you'll find e wide renge of skills and abilities in the auto service trade. While some government egencies license repair shops, primarily to hendle consumer compleints, the mechanics themselves are not licensed by eny regulatory egency. Herein lies e problem.

How do you distinguish between e competent mechanic and one that picks up a wrench end creetes e disester?

Your best bet that a mechanic knows his stuff is NIASE certifecetion. NIASE stands for National Institute for Automotive Service Excellence, set up "to organize end promote the highest standerds of automotive service in the public interest." NIASE sponsors a voluntary mechanic-testing program that's hendled by the American College Testing Program (ACT) in Iowa City, Iowe.

ACT provides test development expertise et NIASE question-writing workshops. Test questions are written by technicel experts from all sectors of the auto service industry. ACT administers the tests under contrect from NIASE.

To qualify for tests, a mechenic must have at least two years of work experience; hands-on ectivity is just as important in certification es theoretical end precticel knowledge. Tests are given in eight categories: engine repair, autometic transmission, manual trensmission end rear axle, front end, brakes, electrical systems, heating and air conditioning, and engine tune-up.

Mechanics can teke tests in as meny categories es they wish. A mechenic who passes at least one test receives a geer-shaped shoulder petch for his workshirt. Underneath this patch are ber-shaped petches indicating the areas in which he's been certified. An eltemate method to indicate certified areas is the display of a card that fits in a shirt pocket. A mechanic who passes ell eight tests receives e double-gear patch indiceting he's e certified generel me-

chanic. NIASE has certified about 220,000 mechanics to date.

If you're wondering how hard these tests are, we're reprinting some actual questions used recently. We invite you to test your knowledge by circling an answer to each of the following 12 questions. The correct answers are given at the end of the story.

*1. Which of these is **least likely** to cause a car to hesitate (stumble) when the gas pedal is opened quickly?*
A. Retarded ignition timing
B. Low carburetor float level
C. Leaking carburetor accelerator-pump check valve(s)
D. Leaking carburetor power valve

*2. All of these statements are true about operation of the EGR (exhaust gas recirculation) emission control system **except:***
A. The EGR valve allows exhaust gases to enter the intake manifold
B. The EGR valve is open at engine idle
C. The EGR system reduces NOx (oxides of nitrogen) emissions
D. The EGR system reduces combustion chamber temperatures

*3. All of these statements are true about a factory installed a/c-heater system **except:***
A. Air flows through the evaporator before going through the heater core
B. Inlet air can come from outside or from inside the car
C. Airflow through the evaporator is controlled by the position of the blend door
D. Outlet air temperature is controlled by the position of the blend door

4. Which of these is a correct method for testing the instrument voltage regulator (limitar) used in some gauge circuits?
A. Connect an ammeter in series with the voltage regulator; if the reading is above 5 amps., the voltage regulator is okay
B. Connect a test light to the voltage regulator output terminal; if the light flashes, the voltage regulator is bad
C. Connect a test light to the temperature sending unit; if the light flashes, the voltage regulator is okay
D. Connect a voltmeter between the battery positive post and the temperature sending unit; if the reading is 12 volts, the voltage regulator is okay

5. While testing a starting circuit on a 350-cu.-in. V8 engine, the mechanic finds that the engine cranks slowly, the starter current draw is 90 amps., and the battery voltage while cranking is 11 volts. What should the mechanic do next?
A. Check the voltage drop of the starter motor circuit
B. Test the battery capacity
C. Replace the starter motor as a short is indicated
D. Determine the condition of the engine

6. After installing new brake shoes and turning the drums, high pedal pressure is needed to stop a car. Mechanic Al says that bleeding the brakes may correct this problem. Mechanic Bob says that arc grinding the brake shoes may correct this problem. Who is right?
A. Al
B. Bob
C. Both
C. Neither

7. On a car with single-piston, floating-caliper disc brakes, the disc brake pad between the caliper piston and the rotor is badly worn. The other brake pad is slightly worn. Mechanic Al says that too much rotor runout could be the cause. Mechanic Bob says that a binding caliper piston could be the cause. Who could be right?
A. Al
B. Bob
C. Either
D. Neither

8. A driver says that the front end of his car vibrates up and down while traveling at most road speeds. Mechanic Al says that too much runout of the front tires could be the cause. Mechanic Bob says that static out-of-balance of the front tires could be the cause. Who could be right?
A. Al
B. Bob
C. Either
D. Neither

9. In a four-speed, fully synchronized transmission, there is a clunking or knocking noise in only first and reverse. Mechanic Al says that a broken tooth on the main drive

(Please turn to page 180)

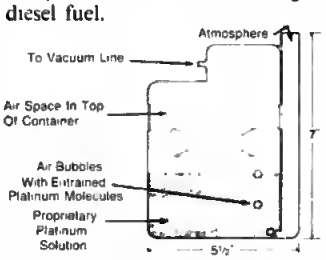
Platinum Technology Detoxifies Gas Guzzlers Into Social Drinkers!

U.S. Patent Office Issues Patent 4,295,816 to National FuelSaver Corp. for Platinum Technology That Permits Much Higher Percentages of Gasoline to Burn in Car Engines.

The EPA's Federal Test Procedure shows that as much as 28% of the fuel entering a perfectly tuned engine will leave the engine without burning. Average engines suffer greater waste.

Research done by Mobil Oil, Corning Glass, Toyota, and Brookhaven Laboratories has shown that a much larger portion of the fuel will burn if the fuel is accompanied by a minute quantity of platinum, large enough to be effective yet small enough to be economical.

Until the development of this platinum dispensing technology, it was not possible to meter this effective yet economic quantity of platinum into the engine, since neither platinum nor any of its stable compounds can be dissolved in gasoline or diesel fuel.



National FuelSaver received the patent by designing the apparatus shown here that takes a water soluble platinum compound, "vaporizes" it, and meters the platinum "vapor" into the engine along with the air and fuel.

15,000 Platinum GaSavers are now in use around the country, achieving an average of 20 to 25% more miles per gallon.

12,000 miles of the platinum cost $69. The equipment and the unconditional money back guarantee are included at no extra charge.

Platinum GaSavers may be ordered by calling: 1-800-343-4022. (MA: 617-731-4444).

Distributors Sought.

PLATINUM GASAVER TEST RESULTS

Vehicle Number	Miles Per Gallon Without GASAVER	Miles Per Gallon With GASAVER	Per Cent Improvement With GASAVER
59	12.0	17.8	48.3%
63	11.3	16.6	46.9%
53	14.1	20.7	46.8%
51	13.0	18.8	44.6%
56	12.2	17.1	40.2%
64	9.6	13.3	38.5%
60	13.3	17.9	34.6%
55	9.8	13.1	33.7%
68	14.3	18.4	28.7%
50	10.8	13.9	28.7%
62	14.1	17.6	24.8%
66	15.8	17.5	10.8%
57	14.4	15.9	10.4%
54	13.1	14.0	6.9%
65	12.9	11.3	-12.4%
average	12.7	16.3	28.3%

Installation of the PLATINUM GASAVER, manufactured by NATIONAL FUELSAVER CORPORATION of Brookline, Massachusetts, was performed on 4/22/80 on the above numbered fifteen 1980 Chevrolet station wagons with 305 cubic inch V-8 engines (odometer readings between 15,070 and 38,784), owned and operated by TRANSPORTATION MANAGEMENT CORPORATION of Medford, Massachusetts.

We, the undersigned, officers of the two corporations (Transportation Management Corp. of Medford, Mass. and National FuelSaver Corp. of Brookline, Mass.) participating in the above study do hereby attest to the accuracy of the data contained herein and do agree that it may be made available for public dissemination, but only in its entirety.

Richard Zimmerman, President, Transportation Management Corp
Ross G. Honig, C.P.A., V.P. & Controller, Transportation Management Corp
Stephen A. Gordon, Fleet Manager, National FuelSaver Corp

FINDING A GOOD MECHANIC

(Continued from page 179)

gear could be the causa. Mechanic Bob seys thet e broken tooth on the countersheft (cluster) geer could be the causa. Who is right?

A. Al
B. Bob
C. Eithar
D. Neither

10. A car with a properly tuned engine is very sluggish on takeoff. It ecceleretes normally ebova 35 mph. Which of these could be the cause?

A. Low transmission fluid level
B. A worn front pump
C. A bed governor velve
D. A bed torqua convarter

11. All of these stataments ere true ebout ignition contact point operation **except:**

A. The dwell begins when the points close
B. The dwell decreases when the point gap increases
C. The ignition timing changes when the point gep chenges
D. The sparkplug fires when the points closa

12. Mechenic Al seys that in e 12-volt, point-typa ignition system the voltege supplied to the coil during sterting is about one-half bettery voltage. Mechanic Bob seys thet in a 12-volt, point-type ignition system the voltage supplied to the coil after tha engine is running is about tha same as battery voltaga. Who is right?

A. Al
B. Bob
C. Both
D. Neither

The program is strictly voluntery—mechanics must study end take tests on their own time. Once they are certified in one or more areas, that's not the end. After five years, e mechanic must be recertified by taking new tests in his specialty area(s) to insure he's keeping up with new developments.

Most shops thet employ certified mechenics displey a metal sign giving evidence of such proficiency. NIASE also has certification programs for euto body repair and painting, plus truck and bus mechanical repair work.

When a mechanic is certified it doesn't meen he can never slip up. After all, he's only human end bleeds when he skins his knuckles. NIASE certification simply means that e mechanic hes demonstrated his competence in specific ereas of automotive service: no more, no less. But it surely helps to seperete the pros from the pretenders. PM

Mechanics' test answers

1-D, 2-B, 3-C, 4-C, 5-A, 6-B, 7-D, 8-C, 9-B, 10-D, 11-D, 12-D

BUILD PM'S TOOL DOLLY

(Continued from page 134)

blade could grab the metel and send the whole thing spinning. Just as the saw was kept cool during the cutting of the sleeves, the same mixture should be used on the hole saw. Once the hole is mede, save the circular cutout; it will be used later.

Using a jig, put together the legs and center section. Once they're spot welded, remove the frame and weld e continuous bead all around each end of the center section. Then place post C into the hole in the center section and weld together.

Install the casters and weld the circular cutout to the top of the post. All welds should be ground or filed down.

Mask off the casters and spray frame, post and collars with primer. Then spray a durable finish coet (we used Plasti-Kote). Once dry, use the support arms to align and drill holes into the aluminum trays. Fasten them with ¼-20 × ⅜-in. Allen button-head screws and washers, end slip the entire sleeve end trey essembly over the post. Then fix lighting to the top of the post. The lemp we used was equipped with e brecket which we attached with two ¼-20 × ⅜-in. Allen button-head screws. Place the aluminum tray between main frame legs. PM

NEW! A SAFER WAY TO JUMP-START YOUR CAR!

Bucket O' Boosters™
BOOSTER CABLES

SAFER TO USE! IT'S EASY!

Bucket O' Booster cebles help reduce the danger of sparks when jump-sterting e dead battery. Tha power ceble should be permanently atteched, just plug the one-way connectors together to complete the circuit.

Buy 2 Sets, SAVE $10.

Patent pending

MORE CONVENIENCE WHEN YOU BUY TWO SETS!

In a two-car family, permanently attach power ceble to each car. Just connect long cable when you need a boost!

Always carry the long cable and alligetor clamps in each car, so that you can get or give a boost when needed!

YOU SAVE $10 when you buy 2 sets!

★ Heevy 6-geuge copper cable.
★ Tangleproof.
★ Flexible in cold weather.
★ High quality industrial grade connectors.
★ 12-ft. length.
★ Packed in heavy duty plastic storage bucket.

Anderson Power Products, Inc.
145 Newton St., Boston, Mass. 02135

Please send boostar cables postpeid, as follows:
☐ Ona set, $29.99 ☐ Two sets, $49.99
Mass. rasidents add 5% sales tax.
Amount enclosed _____.
Check or money order enclosed ____. Visa ____.
Mastercard ____. American Express ____.
Account no. Valid from_____ to_____

Signatura _____
Nama _____
Street _____
City _____
State _____ Zip _____

PM10

(Continued from page 103)

out and try to take over industry leadership in sleek, aerodynamic design, in performance *and* in the traditional values of quality, durability and reliability.

They're not quite there yet, of course. But judging from what we've seen, both new products and important improvements to existing ones that are coming in the next few months, we think they just may pull it off.

Fast gets faster

Mustangs and Capris are nicely face-lifted front and rear and have slightly better aerodynamics as a result. The Capri gets a rear "bubbleback" hatch (which looks better on the LN-7 two-seater), and the Mustang now comes in a lovely new convertible version. Best of all, the ragtop will be available with the hot V8 motor, and five-speed box.

The HO V8's horsepower gets a boost (about 15, they tell us, mostly due to a new four-barrel carburetor replacing the former two-barrel), and a Borg-Warner five-speed transmission is added this year, too.

The '82 Mustang was the fastest car on the road last year. Now, more power on hand should put it beyond the reach of everything else until at least the '84 model year.

In addition to the horsepower, a higher numerical axle ratio (3.27 vs. '82's 3.08) and handling improvements have been added to make the Mustang still more of a driver's car.

There are other improvements up and down the Mustang line. The base 2.3-liter Four, for instance, is recalibrated for better performance. The 3.8-liter V6 replaces the old boat-anchor 3.3-liter Six, which bumps 0-to-60 acceleration by about two seconds with the automatic transmission—at "equivalent or better" fuel economy.

All Mustangs and Capris get larger tires and suspension refinements for more neutral handling—less understeer at the cornering limit. We tried both the newly available Goodyear Eagle HR tires and the Michelin TRXs (part of the optional TRX tire/wheel/suspension package) on the V8, five-speed Mustang GT and Capri RS, and the Goodyears *seemed* to be the hot tip for G-force buffs.

There's also a very nice new option—a multiadjustable bucket seat with a Recaro-like, net-insert, open-head restraint. And brace yourself for the spring introduction of a hot SVO Turbo Mustang featuring the five-speed transmission coupled to the same multipoint electronic-fuel-injected, turbocharged Four that will power the Turbo T-Bird. SVO stands for Special Vehicle Operations—Ford's racing group—and this car promises to be just this side of a street-legal racer. The turbo-Four engine, incidentally, also will be available in the Capri.

Ford hasn't forgotten its front-wheel-drive economy and sporty models in doling out the goodies, either. With basic-transportation buyers pretty well handled by the solid but dull original Escort/Lynx, the stylists made a mild feint at the sporty-car market with two-seat EXP/LN-7 versions of a half-year later, and the power train engineers finally backed up their bluff with a close-ratio four-speed and a stronger "HO" variation of the 1.6-liter engine early this year.

Now, at last, Ford has equipped itself to play some serious hardball with its import competition, thanks to a new multipoint, fuel-injected version of the 1.6 engine with fourth-generation electronic controls (EEC-IV) driving through a *five*-speed manual transaxle.

Most exciting are new Escort GT and Lynx RS versions designed in the image of the famous European performance-model Escort XR-3. Intended for the driving enthusiast on a budget, these neat little sport sedans (three-door only) come with the injected engine, five-speed, TR suspension, functional front and rear spoilers and fender flares.

The injected engine is quick and responsive with 11-second 0-to-60 mph performance, no flat spots in its power curve and (they tell us) nearly as good fuel economy as the base 1.6. The five-speed (actually the basic Toyo Kogyo four-speed re-ratioed and coupled to a separate overdrive box) is crisp and sure. The TR suspension makes the car delightful to toss around. And, if you're not enthralled with the sporty GT or RS trim, you can order the good engine with five-speed or automatic on any Escort or Lynx and the TR suspension on any but the wagons.

Aero-elegance

The new Thunderbird and Cougar are the first in-the-flesh examples of Ford's new North American design philosophy: lower front and higher rear, sharply sloped windshield, tapered front fenders and rear quarters, smooth, rounded edges and not a slab side or sharp corner.

On the T-Bird, notice the restrained use of chrome (though we'd prefer even less), the aircraft-style doors that wrap up into the roof and

(Please turn to page 182)

FREE CATALOGS!
Now you can receive *dozens* of new, colorful, exciting catalogs ***absolutely free!*** Just check *three* of your most favorite categories in the coupon below and send it to us along with *only* $1.00 for processing your order. ***You won't be disappointed!*** Only the finest of mail order catalogs will be sent to your home. . . . ***Act Today!***

YES, I'd like to receive *dozens* of new, colorful, exciting catalogs. I've checked my *three* favorite categories below and enclose $1.00 for processing. I understand that all catalogs will be sent to me absolutely free and I am under no obligation to purchase anything.

☐ Cosmetics ☐ Food Coupons PX 36
☐ Jewelry ☐ Clothing
☐ Gift ideas ☐ Home Furnishings
☐ Electronics ☐ Sewing & Knitting
☐ Toys & Games ☐ Health Products
☐ Automotive ☐ Collecting (Coins, stamps, etc.)
☐ Magic & Gags
☐ Hobbies & Crafts ☐ Other_____

Name
(please print)
Address
City State Zip

Mail to: Nationwide Catalog Network, Inc.
373 Fifth Avenue, New York, N.Y. 10016

REPAIR CLOCKS
Home Study Course prepares you for Good Income – Professional Status
Free Details No salesman will call
Approved by Pa. Dept. of Education
Home business
Big money
NAME
ADDRESS
CITY STATE ZIP
CLOCKMAKERS INSTITUTE
P.O. BOX 449, LEWISTOWN, PA. 17044

NEW! 3 IN 1
POWER-FEED
PLANER/MOLDER
JOINTER
The first affordable shop of its kind!
Now turn low cost rough lumber into valuable finished stock for grandfather clocks, furniture, house-trim, picture frames sell to others Molds all popular patterns & custom designs Planes and joints without change-over Comes complete ready to use
30-DAY FREE TRIAL! Easy terms
PLANER FACTS & PROFITS
FREE INFORMATION KIT
CALL TOLL-FREE 1(800)824-7808, Oper. 842
In Calif 1-800-852-7777, Oper 642
OR WRITE TO
WOODMASTER TOOLS, INC.
2849 Terrace, Dept. PP15, Kansas City, MO 64108

HYDRAULIC JACK REPAIRS
A Business of your own.
Earn while you learn at home Millions of jacks in gas stations, trucking firms, etc. need servicing We show you HOW Start spare time in your basement or garage Big opportunity for mechanics
Write for folder No PM10 and free bonus offer
HYDRAULIC JACK INC.
GPO Box 3 Staten Island, NY 10314

When you want more than just a kerosene heater.

Comfort Glow. The kerosene heater with something more. Push-button starting. Lift-out fuel tank. A built-in fan that circulates heat better. And self-cleaning, porous ceramic wick that lasts and lasts. If you want more than just a kerosene heater, there's a glowing alternative.

Comfort Glow®
A great idea made even better.

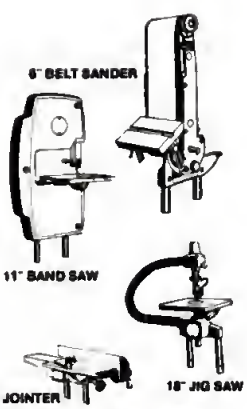
© 1982 AMCA Int'l/ATOMASTER, Bowling Green, KY

5 in 1 WOODWORKING MACHINE

(2 HP EXTRA HEAVY MACHINE)

REGULAR PRICE $1,250
SAVE $ 251 Today
$ 999.

- 34" LATHE
- 10" TABLE SAW
- 11¾" DISC SANDER
- 18¾" VERTICAL DRILL PRESS
- HORIZONTAL DRILL PRESS



VERY IMPORTANT
The only machine built with:
A. ALL CAST IRON TABLES
B. HEAVY DUTY DESIGN
C. 2 H.P. ELECTRIC MOTOR
D. BUILT AS AN INDUSTRIAL MACHINE

SPECIAL ACCESSORIES

ONE PLACE FOR ALL YOUR NEEDS . . .

CALL NOW!!
Toll Free (1-800) 421-2467
In California (213) 549-0761

MAIL NOW!!

☐ VISA ☐ MASTERCARD ☐ MONEY ORDER

PRINT
YOUR NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE ( ) _____ BEST TIME TO CALL _____

PLANT
MASTER WOODCRAFT CO.
Div. of American Machine Co
800 SPRUCE LAKE DRIVE • P.O. BOX 869
HARBOR CITY (Los Angeles), CA 90710
Dealership Available

DRIVING THE '83 FORDS

(Continued from page 181)

forward around the windshield pillar and the blackwall tires on styled wheels. Gone are whitewalls and fake wire wheel covers and padded roofs. The new Thunderbird is very European, *very* tasteful. In fact, in profile and from above it looks a lot like Mercedes-Benz's slippery new $50,000 380 SEC sport coupe.

Mercury's Cougar is intentionally more "traditional" than the new T-Bird, with a more vertical grille, more chrome, a very stiff (GM-style) rear roof and even optional (ugh!) "coach" lamps; for that reason, some may like it better. We're still trying to get used to the roofline, but otherwise find it very handsome and a *huge* improvement over the tasteless, brick-shaped XR-7 it replaces. Those more conservative lines take their toll in wind resistance, however: The Cougar parts the air with a mediocre .40 coefficient of drag vs. the T-Bird's outstanding .35.

Wait until next year

Unfortunately, these exciting new cars won't be introduced until sometime in January. Ford didn't have any representative driveable prototypes for us to try, and so we can't tell you *yet* how they ride, handle and perform. We *can* tell you, though, that they have gas-pressurized front struts and rear shocks like the ones that make the Continental ride so smoothly, optional heavy-duty *and* handling suspensions and a standard, 3.8-liter V6 with automatic transmission.

New this fall are mid-size LTD and Marquis models, which are essentially restyled versions of last year's five-passenger Granada and Cougar sedans, bearing the traditional Ford and Mercury big-car names. These also get a slope-nose, high-deck aero treatment (Cd-.38) and the Continental's gas-pressurized suspension. Engine choices range from an improved (but still slow) 2.3-liter Four through a 3.3-liter straight six and a 3.8-liter V6, to a *propane*-powered version of the Four.

Finally, the Ford truck people would like you to know that their excellent compact Ranger pickup line is enhanced for '83 with addition of an optional, 2.2-liter, four-cylinder diesel and a five-speed manual overdrive transmission, the latter available with either the standard 2.0 or the optional 2.3-liter gas engine. Also, for all you urban—and country—cowboys, there are four-wheel-drive versions of both short- and long-wheelbase Rangers with the 2.3-liter Four. PM

WHERE ARE THE RUSSIANS HEADED

(Continued from page 113)

board a space ship from waste products. Already, half the water used by orbiting Russian space station crewmen comes from waste water. "Space gardens," grown in a special apparatus, aptly named "OASIS," have provided fresh greens for cosmonauts. Within the next five years, it's estimated that 10 to 30 percent of the bulk food consumed by space voyagers will be grown on board a ship or station.

Algae banks arrive

Ground-based experimental algae "banks" have convinced both the Soviets and Americans that there will soon be in-flight air regeneration, expanding oxygen supplies for long trips.

Getting to other planets will require longer flights than 12 months, but not much longer. Trajectories have already been plotted in which a 50-ton module (perhaps similar to the Salyut space stations already in orbit) could carry two or three men out to Mars, swing past the planet, then plunge back across Earth's orbit all the way to Venus. There, an additional maneuver could send the vehicle directly back to Earth. The round trip might take about two years, but Salyut 6, launched late in 1977, was still going strong *five* years later, long enough for *two* double-planetary swing-by excursions.

Propulsion, however, is still a limiting factor. Soviet boosters are not sufficiently powerful to send big enough payloads on fast enough trajectories. But that, too, will change within a few years. Pentagon intelligence officials have publicly confirmed what observers have long suspected: The Soviets are well on their way to completing development of a giant new space booster twice the size of the Saturn V moon rockets of a decade ago. A *single* launch of such a booster would be able to carry a vehicle of sufficient size to support a first manned interplanetary venture.

Landings on the Moon and Mars could follow in the next decade, as new generations of space propulsion systems come on-line. Consecutive missions are expected, each deeper into space and each building upon previous accomplishments, while laying the groundwork for even more ambitious journeys.

A cautious, but steady, forward motion is the earmark of the Soviet space program. (See "USSR In Space," page 112.) This has led the Russians to an impressive series of firsts: first manned satellite to orbit Earth; first man in space and first multiman crew in space.

To Callisto and Io

Jupiter's moon, Callisto, is one example of a reasonable target for early manned exploration. Nuclear propulsion systems could push million-pound space vehicles to the Jupiter system in about a year, where the crew could land and survive comfortably on this outermost moon. There, just out of reach of the lethal Jovian radiation belts, crews would direct robot exploration of other more hostile environments, either deep in the atmosphere of Jupiter or on the radiation-blasted, volcanic surface of baffling, incredible Io, the moon closest to mighty Jupiter.

During their two or three year stay on Callisto, the cosmonauts (who might prepare a celebration for the 50th anniversary of Sputnik, in 2007) would live in insulated shelters. These dwellings would be made of converted propellant tanks and covered with deep layers of that moon's dirty ice to ward off meteorites and stray radiation from Jupiter's magnetic field.

Once established, the cosmonauts would drill deep into the skin of Callisto, seeking regions of underground water—suspected habitats for bizarre forms of life. Turning their attention to the surrounding objects of study, the cosmonauts would operate far-ranging robots by remote control. This could be accomplished far more efficiently from Callisto than from Earth, since the round-trip radio communication time would be only seconds, instead of hours. Remote-control rockets, would release dropsondes over Jupiter, and parachute "moon walkers" to the surface of Io.

Outward bound

For the Soviet space program, the next quarter century will be filled with the fruits of a steadily paced, always advancing quest into the far reaches of the solar system. As with Sputnik, the Russians intend to lead this outward-bound wave. Indeed, their only potential competition for the foreseeable future is the U.S. space program. But we've backed off from manned planetary exploration since landing on the Moon in 1969.

The current low-budget, low-key American space program is geared to unmanned exploration or the Shuttle program. And unless the United States rededicates its resources to manned space exploration, it appears the Russians will have the rest of the universe all to themselves. PM

FREE WATER
and plenty of it!

TAP THE LIFETIME SUPPLY OF FREE WATER IN YOUR OWN BACK YARD

Drill your own well and save hundreds of $$$.

THIS MAN IS DRILLING A WELL
in his own backyard for less than 1/3 the cost of hiring a commercial well driller.

Thousands of home owners are now drilling their own wells from 50 to 200 feet deep! YOU can join them in saying goodbye forever to expensive, chemical-tasting city water! Forget about droughts! Ignore summertime water shortages!

Write or call today for our FREE information package including the booklet "HOW TO DRILL YOUR OWN WELL". There's no obligation—ACT NOW!

DEEPROCK MANUFACTURING CO.
Opelika, Alabama 36802

CALL TOLL-FREE
1-800-821-7700
(Ask for Extension 371)

Call anytime including Sundays or clip coupon and mail TODAY!

DeepRock
SINCE 1962
371 Anderson Road
Opelika, Alabama 36802

Please mail your free information kit.

Print Name

Address

City State Zip

☐ *I'm in a hurry! I have enclosed $1.00. Rush the FREE information package by FIRST CLASS MAIL.*

© 1982 DeepRock Mfg Co

You can take Weinbrenner out of the Northwoods, but you can't take the Northwoods out of Weinbrenner

Our insulated water-resistant "Challengers" may look like others you've seen, but they're not... they're better! Ours feature a revolutionary lining, with added insulation, that surrounds and comforts the foot in long wearing, mildew proof, super breathable material. Also, ours have cushion insoles, steel shanks and a deep cleated sole and heel for extra traction and support. When you're ready for a new pair of boots, try on ours before you decide. And remember, you can take Weinbrenner out of the Northwoods, but you can't take the Northwoods out of Weinbrenner.

FREE... A colorful, oversize bandana with the purchase of a new pair of Weinbrenner boots or shoes during the month of October at these participating dealers. Hurry, supply is limited.

SINCE 1892

WEINBRENNER

MERRILL, WISCONSIN 54452

A Bata COMPANY

CONNECTICUT

Bridgeport	Jimmy s Army & Navy
Danbury	Markhoff Shoe Store
East Hartford	Industrial Uniform
Manchester	Manchester Green Shoe Outlet
New Britain	Vogue Shoes
Norwalk	Eli s Army & Navy Inc
Norwalk	Quoddy Mocc
Norwich	Gordon s Factory Outlet
Orange	Quoddy Mocc
Rockville	Zahner s Shoe Shop
Seymour	Klarides Shoe Salon Inc
Stamford	Greenberg s Inc
Torrington	Soucy Choquette Inc
West Hartford	Simmons Shoes
Wilton	Wilton Bootery Inc
Winsted	Winsted Bootery

DELAWARE

Wilmington	Joe s Streamline Army-Navy

FLORIDA

Apopka	The Shoe Tree
Arcadia	Mercer s Men s & Western Shop
Belle Glade	Hollingsworth Shoes Inc
Cocoa	Cocoa Saddle Shop, Inc
Cross City	Jones Department Store
Ft Walton	Army & Navy Surplus Stores Inc
Gainesville	Alachua Gun & Tackle Shop
Gainesville	The Rancher Inc
Holly Hill	Rocky s Holly Hill Shoes
Homestead	Orlandes Shoe Shop
Homestead	Sunset English & Western Wear
Jacksonville	Green Acres Sporting Goods
Kissimmee	Roberson s Sporting Goods
Lake City	Capells Shoe Store
Lake Butler	The Country Hub
Ocala	Sport City Inc
Orlando	Behr s Shoe Center
Orlando	Boot Country
Orlandd	Engel s
Orlando	Southeastern Archery
Ormond Beach	Max s Gun Shop Inc
Plant City	Baxter & McDonald Inc
Sarasota	Tucker s Sporting Goods
Sebring	Wilson Family Shoe Store
Tallahassee	The Loft
Tallahassee	Trigger Enterprises Inc
Tampa	Porter s Gun Shop

GEORGIA

Americus	Pete Smith Hardware & Supply
Augusta	Widner Arms Inc
Bailey	Finkelstein s
Boston	Boston Farm Center
Clarkesville	Carey s
Clayton	Reeves Hardware
Cornelia	Freedman s
Cuthbert	Mattox s
Dalton	Dalton Bootery
Douglas	Walkers Shoe Palace
Dublin	Five Points Shoe Shop
Fitzgerald	Fitzgerald Shoe Hospital
Glenville	Lipsitz Department Store
Griffin	Shootin Iron Shop
Jeffersonville	Browse Center
Lakeland	Lakeland Ace Hardware
Lincolnton	Well s Service Station
Metter	The Sport Store
Milledgeville	Hines Sporting Goods Inc
Sardis	Charles Sporting Goods
Savannah	Cranman s Sporting Goods (6 Television)
Savannah	Cranman s Sporting Goods (223 West Broad)
Statesboro	Hook Line & Sinker
Statesboro	Newton s Sport Shop
Statesboro	Patterson Griffin Shoes Inc
Summerville	Packer s Shoe Store
Sylvania	Sheppard s Sporting Goods
Thomasville	Knapp Hardware
Trenton	Char-Dells Shoes
Tunnel Hill	Tunnel Hill Footwear
Valdosta	Sam Lazarus Company
Vidalia	Army-Navy Store
Waycross	Schreibers Bootery

MAINE

Auburn	Quoddy Mocc
Brewer	Epsteins Inc
Camden	Haskell & Corthell
Gardiner	Wilson s Dollar Stores Inc
Portland	Quoddy Mocc
Wells	Dunhams Footwear Outlet
Wilton	Heart of Maine Casuals
Winthrop	Wilson s Dollar Stores Inc

MASSACHUSETTS

Andover	Quoddy Mocc
Attleboro	Malley s Shoe Store
Brockton	Dunhams Footwear Outlet
Burlington	Dunhams Footwear Outlet
Cambridge	Dunhams Footwear Outlet
Chicopee	Balakiers Inc
Chicopee	Paul s Shoes
Franklin	Ficco Shoe Store
Florence	West Clothing Center
Greenfield	Manny s Sport Shop Inc
Holyoke	Triangle Shoe Store
Middleboro	Stries Shoe Store
Natick	Dunhams Footwear Outlet
New Bedford	Lincoln Shoe
New Bedford	Poyant Shoe Store
North Adams	Garidd Sales Company
Palmer	Nick s Sport Shop
Penbrook	Quoddy Mocc
Raynham	John Bright Shoe Store
Salem	Dunhams Footwear Outlet
Saugus	Dunhams Footwear Outlet
Springfield	Hamjet Inc
Springfield	Quoddy Mocc
Springfield	Sam s Army & Navy
Three Rivers	Ski In, Inc
Worcester	Kangaroo Crossing

NEW HAMPSHIRE

Keene	Dunhams Footwear Outlet
Nashua	Dunhams Footwear Outlet
Merrimack	Dunhams Footwear Outlet
North Conway	Dunhams Footwear Outlet
West Lebanon	Dunhams Footwear Outlet

NEW JERSEY

Camden	Garden State Surplus
Chester	Jimmy s Army & Navy
Clinton	Charlie s Bootery
Freehold	Somerset Shoe Company
Medford	Johnson s Men s Shop
New Brunswick	Johns Inc
Pennsauken	Joel The King of Shoes
Robbinsville	Harry s Army & Navy
Somerville	The Bootery
Teaneck	Blazerville, Inc
Vineland	Martini s Shoe Store
Woodbury	Polsky s Army & Navy

NEW YORK

Albany	Quoddy Mocc
Buffalo	Quoddy Mocc
Canadaigua	Shoe Racks
Farmingdale	Al s Work Clothes Inc
Glen Falls	Maple Street Discount
Granville	Wilson Clothing Company
Mt Kisco	Quoddy Mocc
Rochester	Quoddy Mocc
Rochester	Shoe Racks (Culver Ridge Plaza)
Rochester	Shoe Racks (Henrietta Plaza)
Rochester	Shoe Racks (Lyell Mt Road Plaza)
Syracuse	Shoe Racks
Utica	Quoddy Mocc
Utica	Shoe Racks

NORTH CAROLINA

Albemarle	Jones Shoes
Boone	Hunt s Department Store
Drexel	Prices Department Store
Fayetteville	Paschal s Shoes Inc
Garner	Williams Farm Supply
Raleigh	Smith Shoe Service
Robbinsville	Snider s Department Store
Robersonville	Griffin Shoes
Valle Crucis	Mast General Store

OHIO

Bucyrus	Thomas Shoes
Carey	Kurtz Shoe Store
Cincinnati	Stefans Shoes
Columbus	Wes Lin Golf
Dayton	Roderer s Shoes
Defiance	Jack s Comfort Shoes
Fostoria	Bill s Men s & Boys Wear
Lancaster	Lancaster Sales
London	Woods Shoe Store
Millersburg	Berlin Shoe Repair
Newark	Maybold Shoes
Pickerington	Ritchey Bros
Picqua	Walkers Shoe Store
Pomeroy	Hartley s Shoes
Sandusky	Morton s Shoe Shanty
Upper Sandusky	Paul s Shoes
Woodsfield	Smith Shoe Store
Zanesville	Combs Shoes

PENNSYLVANIA

Butler	Sportsman Supply Company
Corsica	Jack s Hardware
Du Bois	The Outfitters
Elizabethtown	Trop Gun Shop
Harborcreek	Nelson Outfitters
Jeannette	Arlington Shoe Repair
Kennett Square	Barrie Shoes
Lebanon	Arnold s Boot Shop
Lebanon	Shyda s Gun Shop
Loganton	Kauffman Harness Shop
Myerstown	Dingers Shoes & Clothing
Pennsburg	Valley Shoe Center
Philadelphia	I Goldberg A & N
Reading	R P Longenecker
Red Lion	Mellingers Shoes
Royersford	Globe Shoe Store
Shrewsbury	M & C Shoes
Smicksburg	Miller s Shoes & Boots
Souderton	Frederick s Shoes
State College	Jim s Army & Navy Store
Uniontown	Terner s Outdoor World
Wilkes Barre	Penn Lee Footwear
Williamsport	June s Sporting Goods
York	Wolfgang Shoes

RHODE ISLAND

Cranston	Quoddy Mocc
Newport	George G Popple Company
North Kingstown	The Shoe Store Inc
Providence	The Shoe Horn
Warwick	Best Step Shoes Inc

SOUTH CAROLINA

Chester	The Hub Inc
Columbia	Kings Inc
Easley	Roberts Bargain Store
York	McGill s Store

VERMONT

Barre	Dunhams Footwear Outlet
Bennington	Dunhams Footwear Outlet
Brattleboro	Dunhams Footwear Outlet
Burlington	Dunhams Footwear Outlet
Colchester	Clog Factory Shoe Store
Essex Junction	Timberline Sports
Milton	Milton General Store, Inc
Rutland	Dunhams Footwear Outlet
Rutland	The Sensible Shoe

VIRGINIA

Dumfries	Little Shoe Box Inc
Lexington	Rockbridge Farmers Co-op
Nelson	Family Grocery
Winchester	Old Dominion Sports Center

WEST VIRGINIA

Hinton	Don s Sport Shop
Mannington	Shoe Towne
Moundsville	Allen s Bootery, Inc

 (Continued from page 99)

LED arrow tells you how to turn the focusing ring. When you bring the center of the view into focus, a green, round LED lights.

As light enters the lens, it's split into three equal beams. Each beam falls onto one of the three tiny CCD circuits. These circuits convert light into digital pulses which are analyzed by the camera's on-board microprocessor.

The middle CCD senses the light rays which come from the subject. The other two CCDs sense light which comes from behind and in front of the subject. The contrast and intensities of these three processed images are sent, in pulsed form, to the microprocessor.

The microprocessor compares the three outputs. When the output of the CCD which senses light from behind the subject is equal to that of the CCD sensing the light from in front, then the focus of what the middle CCD senses as the main image is correct.

We found it was great fun to focus the AL-1 on one object and then on another object very close to the original. The arrows guide you immediately to a proper focus that your unaided eyes might have missed.

Disc-o-tech

My grandfather, who worked for Kodak in Rochester, N.Y., about 30 years ago, came home with one of the then-new, prototype Hawkeye cameras. It was the first, easy-to-use, more-than-a-box camera and it excited the whole neighborhood.

But today, Kodak's new disc system of photography has excited the whole world.

Kodak has taken easy photography and made it completely automatic. With the disc system, you're just about guaranteed good photos—as long as you can compose through the viewfinder.

The heart of the system is the disc cartridge. Because it's a disc, it was relatively simple to design an automatic film transport. When you take a picture, the disc spins so that the next negative along its perimeter can be exposed. The negatives themselves are made of a new high-resolution emulsion. They had to be, because in order to fit on the disc, the negatives were made very small. Normal emulsion-based negatives so tiny could not have been enlarged properly.

Because the negative area is so small, it's possible to place the lens very close to the film plane. This makes for a short focal length from the back of the lens to the film, which gives the camera a very long depth of field. This means that objects from the foreground to infinity are all in focus.

Then, using new lithium battery technology, Kodak designed a compact power system. Although this system powers the flash and film transport and runs the camera's other systems, it will last five years before needing replacement.

It is by far the simplest camera on the market to use—and it gives results that all but professionals will be pleased with. We used it in just about every lighting condition—and we couldn't *make* it fail.

Leapin' images

The four-eyed Nimslo camera is a combination of unique design and shooting simplicity. And it produces photos that really do have a three-dimensional effect.

A Nimslo photo (it uses regular 100 or 400 ASA film, only the processing is different) appears to be covered by a grooved, plastic overlay. As you move the photo, or your eyes, the background of the image seems to shift behind the foreground—just about the same parallax effect you see in a real-life scene.

The plastic overlay is composed of many long, thin lenses (200 per inch) which overlay the image area. The lenses blend the specially processed, multipart image areas.

As the illustration on page 99 shows, the Nimslo's four lenses each produce one negative that's half the size of a normal 35-mm image area. (A Nimslo picture gets 10 photos per 20 exposure roll because of this.)

Each of the four image areas carries a picture slightly different from its neighbor's. Together, the images comprise four separate shots of the same subject shot from four close, but separate, viewpoints.

Now, these *four* negatives must be blended into *one* three-dimensional picture.

Each of the images is divided optically into thin strips. Eight strips from one negative, eight from the next and so on to 32 strips, are placed side-by-side under each lens.

The lenses reflect light from the image slides in a way that almost recreates the manner in which light left the original scene.

The main "trick" to being a good photographer with this system is learning to think in 3-D. Taking photos of flat, more or less one-plane images results in dull finished work. You need a good foreground subject with a distant and complex background to best show the 3-D effect. But there's nothing we've seen quite as eye-catching as a well-composed 3-D photo!

Filmless photography

Sony, a giant in the world of video, is trying to turn the entire world of photography topsy-turvy with an all-electronic system that uses no film at all. The new Mavica system, which we first described last year (see *Tech Lines*, "New Filmless Camera," page 137, Dec. '81), displays its final pictures on the family television set (still-frame) or an optional, on-paper printer.

While Sony has been showing prototypes of this system for more than a year, they have yet to deliver an operating system for editorial review or sale to the public. Still, what is promised could be revolutionary.

The Mavica camera also uses the new CCD circuitry which converts light into electrical, digital impulses that computer-style devices can work with. On the Mavica, the CCD is right behind the lens.

Light from the lens is split. Part goes to the viewfinder and the rest hits the CCD. The CCD sends the light, in the form of digital pulses, to a video circuit in the camera.

The video circuit processes this pulsed information and stores it in encoded form on a Mavipak cartridge. This cartridge contains something quite similar—in many ways identical—to a computer's floppy disc storage.

The picture as information is written to the disc in a binary format. The disc, a wafer of recording medium, is then removed from the camera and plugged into a device similar to a videotape recorder. This is connected to a home TV, which is the main display device.

Sony also intends to market a printer. The printer reads the encoded data and converts it to a paper print via three primary-colored dye-impregnated papers.

And because the picture is digital, a Mavica photo could be sent over the telephone as audio tones, or on a tape recorder.

The Mavipak itself can be erased and reused. So there is also the prospect of very low "film" cost.

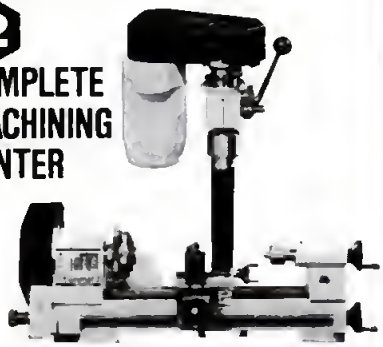
But the price of a complete Mavica system makes it far less competitive than the other systems mentioned. Sony estimates cost to be comparable to that of a full-fledged video system of video recorder and camera—well over a thousand dollars. But prices will likely fall. PM

Unimat 3

A Small Machine System for Metal Wood and Plastic

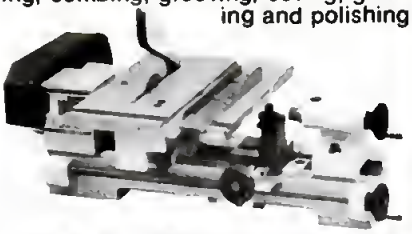
1 PRECISION LATHE (Basic Machine)
Distance between centers, 8". Swing-over bed, 3.6". 8 spindle speeds. 115 V 2-speed motor.

2 COMPLETE MACHINING CENTER



Vertical milling and drilling accessories can be used for fly cutting, grinding, slotting, parting-off and can be swiveled up to 90°

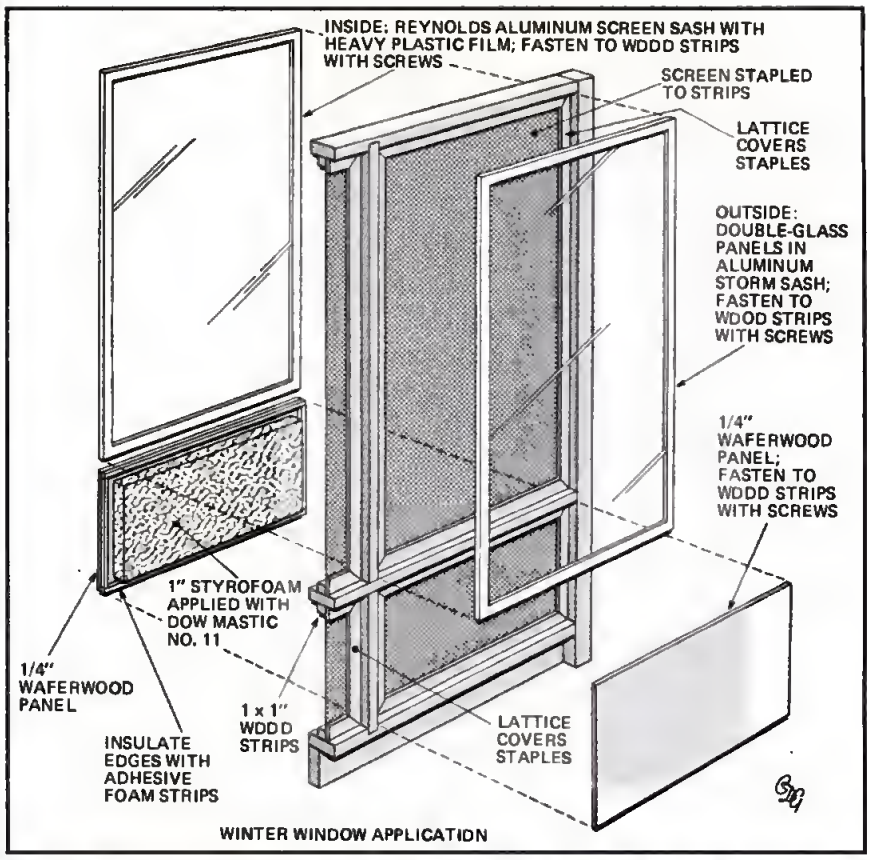
3 WOOD WORKING
This version makes your workshop complete with circular, jig and fret sawing, combing, grooving, coving, grinding and polishing.



ORDER DIRECT AND SAVE
NOW $259.00 (basic lathe) accessories extra
OHIO RESIDENTS ADD 5.5% SALES TAX

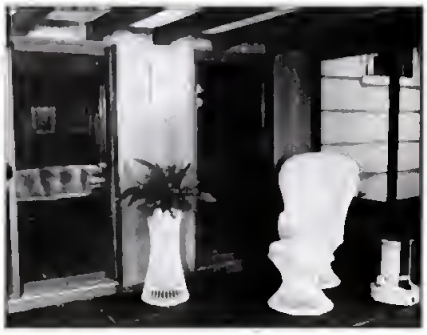
Phone 614/445-8320
Send free catalog and price list for accessories ☐
Check ☐ Money Order ☐ Visa ☐ M.C. ☐
CARD NO. _____ EXP DATE _____
SIGNATURE _____
ADDRESS _____
CITY/STATE _____ ZIP _____

hobby products co.
P.O. BOX 07846 COLUMBUS OH 43207



WINTER WINDOW APPLICATION

Winterizing the porch includes fastening particleboard over lower windows. Here a panel is secured with screws through each edge of the panel into a wood strip.



Sliding patio door leads to living room. Stationary window (center) lets light in. "Winter windows" (drawing above) and space heater ready porch for cold weather.

DOUBLE-DECK PORCH

(Continued from page 121)

level chalkline on the sheathing. Also remove siding to attach the two adjacent posts to the house studs with 6-in. lagscrews. Resnap the vertical chalklines; use a spirit level to ensure that the lines are plumb and level. Run a bead of caulk along the chalkline. Lagscrew header to second-floor joist header. Apply aluminum flashing over the sheathing and lap it on the header.

At each post location, bore an oversize hole through the flagstone into the concrete for a bolt to secure the post anchor bracket. Secure the bolt with patching cement. Slip the bracket over the bolt and secure it with a washer and nut. Set the post in the anchor. Secure the post with nails through predrilled holes on the bracket. Brace posts with two diagonal 2×4s until framing is done.

Lay out locations of the rail-post fasteners on the header joists. Install the joist hanger hardware. Then measure, cut and fasten joists to posts with metal post-and-beam connections. You must use a ½-in. pine filler between posts with the connector (see detail on page 121).

The spiral stair post supports a corner of the deck overhang. Erect the stairway at this point and fasten it in place. We bolted the top step to the joist.

Next, we cut posts for the deck railing to size. Cut dadoes for top

and bottom rails; install posts in metal connectors already placed.

To finish the ceiling, we nailed 2×2 cleats near the top of the joists; then fastened ¼-in. particleboard panels to the cleats.

After framing porch windows, we nailed 1×1-in. strips around each frame and used heavy-duty, galvanized staples to fasten screening permanently to the strips. Lattice strips cover the staples.

For proper drainage of the deck level, we attached 2×4s cut on a skew (to direct water to the rain gutter) to the joists. Over this we fastened ¾-in. particleboard sheathing with panels staggered to avoid any long seams.

Then we applied 15-lb. roofing felt (tarpaper) parallel to the house wall. Each layer should overlap the preceding one 12 in., starting at the lower edge. Next, we installed 30-lb. mineral roll roofing, sealing it with asphalt cement. Each strip laps the upper half of the previous strip to get a double thickness over the deck.

The next step is to flash the railing posts (see post flashing detail, page 120). Solder the two-part aluminum flashing together or join it with plastic cement.

Leveling the surface

To level the deck surface, we positioned 2×6s tapering toward the house. Space the 2×6s 24 in. on centers; temporarily tack some 1×4 decking on top of them to hold position. When they are set, begin to nail decking at the railing; work toward the house, staggering the joints.

To avoid splitting, prebore 1×4 decking for fasteners, especially near edges. Trim board ends after nailing deck to ensure a straight line.

The deck railing has 2×4 top and bottom rails between posts with 2×2 balusters 4 in. apart. Using a circular saw, cut baluster grooves centered the length of each rail (see railing detail, page 121). Cut balusters to length, test-fit and assemble rails and balusters with resorcinol glue and 6d galvanized nails. Install 4-in. spacers between balusters on the bottom rail to fill the groove, then the railing sections between posts, and finally the post-cap support blocks and caps.

We wanted to stain the lumber a rich brown, but we have to wait six months to let salts leach out.

In the meantime, you can work on the window treatments (see winter window application drawing on facing page). An indoor-outdoor porch like ours is sure to increase your enjoyment of the outdoors and encourage you to entertain. **PM**

America's Best Selling Size!

Light, compact and easy to use, the single-stage Yard-Man Bantam is just right for 8 out of 10 homeowners!

A true snowthrower in all respects, it's great for average sidewalks, driveways, patios and "in close" areas.

All-Steel Construction. Convenient controls. Fully portable – hangs out of the way.

More Snowthrower for the Money!

Rugged 2-stage Yard-Man Snowbirds feature oversized intake, auger and flared impeller for extra performance – throw your snow up to 40-feet away!

Most have 5 forward and 2 reverse speeds and self-propelled drive for easy maneuverability.

All Steel construction. Convenient controls. Big tractor-bar tires. Folding handles for off-season storage.

Everybody In Your Family Will Love Their YARD-MAN Snowthrower!

Yard-Man Snowbirds . . . America's Greatest Snowthrower Values . . . are in stock now at your local Independent Yard-Man Dealer. Find his location in your local **Yellow Pages** under the heading **"Lawn Mowers"**. . . then visit him for the size you need at a price you can afford. (Sorry, no dealer listing available from Yard-Man.)

YARD-MAN

Yard-Man Company • PO Box 36940 • Cleveland, OH 44136

 (Continued from page 117)

plate. Note: Operate your router only at the voltage shown on the nameplate or the motor will burn out.

Nowadays, almost all power tools are double-insulated so you don't need the old three-prong (grounding-type) plug. But if your router does come with a three-wire cord, be sure to use the proper adapter so that the tool is safely grounded.

When you get your new router home, check the box—make certain you have all the pieces that you paid for. Then take time to become familiar with the router and all those accessories you own. And don't forget to fill in and send back the warranty card.

Getting ready

Since that work end of the tool—the bit—is always out there in space ready to do its job, even on your fingers, make it your habit from the start to disconnect the tool from power whenever changing bits. Insert the desired bit into the collet until it bottoms, then back it out 1/16 to 1/8 in. This procedure is to protect the collet from breaking due to heat expansion.

I generally finger-tighten the collet nuts until they're "snuggled" against bit shank, and then reach for wrenches to finish up the tightening.

Make absolutely certain that the collet is *fully tightened* before restoring power to your router. Failure to correctly install a bit and tighten the collet could result in a bit hurtling about the room like a piece of shrapnel.

Next, reassemble the motor into the base (on my model I just have to loosen a wingnut on the base). Slide the motor fully into the base and tighten the wingnut.

Set bit depth

To use the micrometer ring on a router to set bit depth, follow these steps:

1. Place the router on a flat surface.
2. Loosen the wingnut and slide the motor down until the bit barely touches the surface.
3. Retighten the wingnut.
4. Rotate the depth adjustment ring until it hits the base. Now the bit is set for 0 in. depth of cut.
5. Note the position of the graduations on the depth-adjusting ring in relation to the index on the router base (usually a point, or arrow).
6. Rotate the ring in the appropriate direction to achieve the desired depth of cut. On my router the depth is changed by 1/64 in. for every three graduation lines; thus the depth is changed for 1/32 in. for every six graduation lines.
7. Loosen the wingnut and slide the motor as far into the base as the depth-adjusting ring permits. Retighten the wingnut and you can put the router to work.

The above procedure applies specifically to the Rockwell model I own. Consult your router manual for any possible variations.

Pro trick: Certain cutters are used more often than others in the type of woodworking most of us do. This includes the rabbet and straight (mortise) cutters. Thus, I made up a board with both of these cuts plowed to exactly 1/4- and 3/8-in. depths—the usual depths for working with 3/4-in.-thick boards. Each time I need to set a 3/8-in. rabbet cutter 3/8 in. deep, I don't have to fiddle with rulers; I simply and quickly set the bit using the precut board.

There are five ways to guide a router:

1. With a pilot on the bit.
2. With an edge guide.
3. Freehand.
4. Against an edge.
5. With a templet guide.

Methods are listed in the order that I think a beginner should tackle them—the easiest is first.

Guiding with a bit

Almost all decorative edging done with a router is with a bit that has a self-contained pilot. The pilot rides the edge of the material during the cut, so it is important that the edge be in perfect shape. For example, when putting an edge on a piece of plywood the pilot will enter any voids in the plywood, causing the decorative edging to indent, too.

When using a piloted bit make the cuts sequentially as shown on page 115. Always start the router with the cutter standing away from the wood, then feed the spinning bit into the workpiece. Since the router bit spins in a clockwise direction, when viewed from above, an outside edge is always routed from left to right. Feed the tool in about 1/4 in. or so from the left end of the board, push right for a couple of inches then bring the tool all the way to the left and off the board. If you are routing just the one edge, don't allow the pilot to turn the board corner or you will edge-shape the end of the board as well. If necessary, you can tack a guide to the workpiece in order to prevent this.

Make no mistake—as simple as this routing task will eventually be for you, in the beginning it takes practice to master.

Several rules:

- Always rout the edge grains first as shown in the drawing on page 115. You will learn that as the router bit exits an end grain on the far end it is not uncommon to have some splintering. If this is your last pass, it means that the finished adjacent edge may be splintered. But, done correctly, end grain first, the following pass—with the grain—will remove the splintered wood.
- A constant rate of feed is important for achieving a smooth cut. The point is to work your tool so that the router is working at its highest possible rpm. This will vary, depending upon the material being worked, depth of cut, sharpness of cutter and so on.
- As soon as the cut is completed, release the trigger to turn off the power to the router. Do not put the tool down until the cutter stops spinning.

Using an edge guide

An edge guide should probably be the first accessory that you buy for your router. As can be seen in the photos it is particularly useful for cutting blind mortises and the like, such as for the hidden-spline miter joint. For more details see page 116. Take time to read the manufacturer's instructions for the edge guide to ensure installing and using it correctly.

Freehand work

Freehand routing is plain fun, even when you're just showing off. More often than not when routing freehand you will probably be making a sign or plaque.

There are two basic freehand techniques:

The letters or pattern can be cut directly into the wood.

You can rout out the background, leaving the letters raised from the surface.

To do freehand routing you must first put the pattern directly on the workpiece, using either a pencil or felt tip marker. Next, select the appropriate bit. Bits generally used for freehand work include the core box, straight (mortise type) for large areas and the veining bit for more delicate work.

In general, you should not rout more than 1/4 in. deep. The deeper the cut, the more difficult it will be to follow a pattern. Ordinarily, you should make the first depth setting equal to about 25 percent of the

desired finish cut. The initial cut then acts as a guide for the final, full depth cutting.

Though safety glasses should be worn for all types of routing, it is absolutely imperative that they be in place when freehand routing. It is often necessary to get your face down close to the tool base to follow the pattern with your bit.

Guiding against an edge

The fourth method for guiding a router is to keep the base against an edge of material. The edge can be straight, such as for plowing long grooves or dadoes, or it might be curved or scalloped to suit a custom task.

Clamp the board (or templet) securely to the top surface of the material being routed and guide the router in a counterclockwise rotation (left to right, as in edge shaping). Be sure to *keep the shoe in contact with the guide at all times.*

A typical application of such cutting would be the plowing of dadoes to receive let-in shelves, (on opposite vertical panels in a bookcase). Once the panels are laid out, they can be clamped or tacknailed together (side by side) so the grooves (dadoes) can be made across both boards at the same time.

Templet guides

Templet guides are accessories available for the router. Since these elevate the user into the world of advanced wood craftsmanship, some of the simpler do-it-yourself router models are not designed to accept templet guides.

The guides are locked in the router subbase using various means, depending upon the maker: Some are held with screws, others with locking nuts. In place, the guide's collar projects down from the shoe. The collar, in turn, rides a pattern edge, such as a dovetail templet or a templet for butt routing (routing the mortises for door hinges).

If you are heavily into woodworking—or plan to be—you will at some point want to master the templet guides, if for no other reason than to be able to produce accurate dovetail joints quickly.

About bits

The basics are shown and discussed on pages 116 and 117. Over the long haul, you'll come out ahead if you purchase carbide-tipped bits to begin with. But this is true only for those who use a router fairly regularly. Here's my reasoning: Steel router bits, depending upon style, are priced from $8. The average person cannot sharpen his own bits; thus each time the bit is sharpened professionally you'll pay another $3 to $5. Cutting edges on a carbide bit will outlast those on a steel bit many times. Even with an initial outlay that may be three times as much ($18 to $25) you'll save money after only three or four projects.

A dull pilot bit will cause scorch marks on the edge that it rides. For this reason work only with sharp bits.

A final word

Take time to read the manufacturer's manual that comes packed with your tool. Quality toolmakers have the user's interest at heart; they want you to master the tool so you can get the most out of it.

If you're satisfied, the chances are your next power-tool purchase will be the same brand. In addition to operating instructions, the manual will also provide a maintenance rundown. It is in your best interest to maintain the tool as suggested. PM

HUNDREDS OF NEW WORKSHOP PLANS (Plus Crafts & Hobbies!)

- **Furniture and novelties for:**

  Yard
  Kitchen
  Livingroom
  Bedroom
  Workshop

- **Games, Sports Birdhouses, Toys!**
- **Christmas Decorations!**

So Simple... No Previous Experience Needed

Royal Plans Catalog

You'll be amazed how easy it is to use our plans. You'll have a complete list of materials necessary. Eech plan tells you *every* step . . . down to the lest upholstery teck! The whole story is told with cleer pictures. You even get actual-size cutting guides for shaped parts. We mean it when we say . . . simple! Plens as low as $1.00 eech. *Don't miss out.* Send $1.00 for catalog (refundable with first order). Today!

SATISFACTION GUARANTEED

ROYAL PLANS, Dept. RPC1773 137 Walsh Ave., Box 4305, New Windsor, NY 12550
Please send me your plan-filled catalog. I enclose $1.00 (refundable with first order).

Neme _____

Address _____

City _____ State _____ Zip _____

True Value® has it!

Tufoil® FOR ENGINES

"A super-slick oil additive that works!"
Popular Mechanics Magazine, January 1982

Cuts the cost of owning a car

9.88 True Value price
–1.50 manufacturer's rebate
8.38 your final cost

So unique it's patented!
U S Patent Nos 3 933 656
4 127 491 & 4 224 173
Other U S and International Patents Pending

TUFOIL is a Reg TM of Fluoramics Inc

Engine lubrication will never be the same once you add TUFOIL to your oil! Because TUFOIL is the amazing new additive that turns any brand of oil into a super-lubricant. No oil, no matter how expensive, can do alone what it does in combination with TUFOIL. That's a proven fact. Add TUFOIL to your motor oil for:

- Better mileage
- Increased horsepower
- Faster acceleration
- Quieter operation
- Easier starts
- Reduced oil consumption
- Fewer oil and filter changes
- Longer engine life

Discover for yourself why TUFOIL is the leader in the new technological era of Super-Lubrication.

There are over 6,000 True Value Hardware Stores and Home Centers in 50 states. Look under "Hardware" in the Yellow Pages.

True Value HARDWARE STORES®

For the newest ideas in money-saving, do-it-yourself car care, shop your nearby True Value Hardware Store or Home Center for brand name products at low prices everyday.

TECHNOLOGY UPDATE

A guiding light, by day or night

Aviation

Visual approach slope indication (VASI) devices have been in use at most civil airports with scheduled traffic for about 30 years. With the exception of intensity gains and better reliability, they haven't changed much. Now, what is being called the second generation of VASI is being developed and installed. One of the leading contenders is based on an idea from the McDonnell Douglas Corp. that was eventually developed by DeVore Aviation Corp. It is known as PLASI, for Pulsating Light Approach Slope Indicator.

In tests at airports in the United States and overseas, airline pilots have found it preferable to older systems (and, in some cases, to a competing British system).

Housed within a rectangular box that's less than three feet long (not shown to scale below), the PLASI shows the incoming aircraft an "on-glidepath" signal consisting of steady white light. If the plane (or helicopter, for which the system was originally designed), climbs above the glidepath, the pilot sees a pulsing white light; if below the slope, he'll get a pulsing *red* light. Migrations, either high or low, produce pulses that gain in rapidity according to the degree of deviation.

The unit can be easily adjusted to provide a steep glidepath for helicopter approaches or a normal one for fixed-wing aircraft. Obstructions on or near an airport can be considered in setting glidepath angles.

One of the advantages of the DeVore system seems to be its efficiency. The lights are visible from nearly 4 miles off the runway with bright sunlight directly behind the approaching aircraft—the worst visibility condition. This intensity is derived from 900-watt Sylvania tungsten-halogen projection lamps with an overall power drain roughly equivalent to that of a home hair dryer. Five lamps are mounted on a turntable which moves a new one into place automatically in the event of a burnout. When the last lamp is active, a warning light on top of the casing goes on.

PLASI system lights are visible for over 10 miles off a runway in most conditions, including night operations when a photocell reduces the voltage to the lamps for longer life and less power drain.

New lightning scare

With composite materials being used increasingly in wing and empennage structures of newer civil and military airplanes, lightning strike could be a new threat. If the bolt's energy isn't bled off easily, as it is by all-metal wings and other parts, the resulting arc might ignite fuel in the tanks. Boeing Co. has a contract to study ways of dissipating lightning from composite materials.

Medicine

Cold capsule

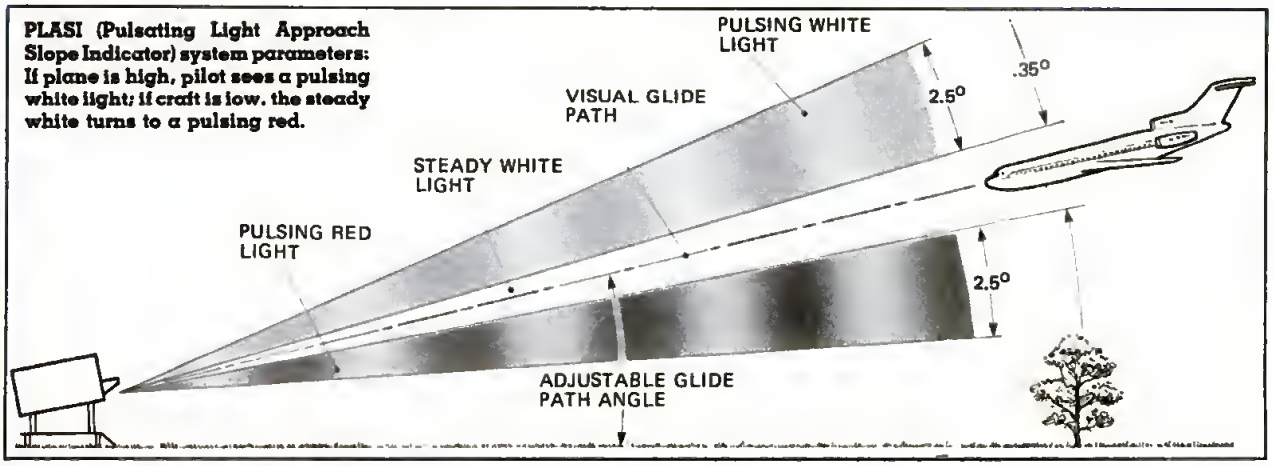
With most weekend athletes getting more familiar with sports medicine principles, the RICE (rest, ice, compression, elevation) method for treating sprains and strains is fairly well known.

Only the rest part is at all controversial, since many doctors now prescribe ethyl chloride spray followed by immediate exercise of the injured part.

Sportslife's new cold pack is taped over muscle: pressure starts cooling chemical.

The new chemical cold packs might provide a good intermediate path for nonprescription treatment. The one in the photo is new from the West German firm of Manan and is being sold under the Sportslife brand. Pressure on the pad produces an immediate cold effect that lasts about half an hour.

PLASI (Pulsating Light Approach Slope Indicator) system parameters: If plane is high, pilot sees a pulsing white light; if craft is low, the steady white turns to a pulsing red.



Energy

Germany's 'cool' coal fire—no pollution, no acid rain, no chimneys

The buttons, bumper stickers and decals are omnipresent in West Germany these days. Bright red and yellow, they depict the sun with a smiling face and bear the slogan: *Atomkraft? Nein Danke!*—Atomic Energy? No, Thanks!

This antinuclear movement poses a seemingly insoluble problem for the Western world's second largest industrial nation. West Germany today meets half its total energy and 70 percent of its heating needs with oil, 97 percent of which it has to import.

But if not the atom, and if not oil or gas, how then to meet fuel requirements that have doubled during the past 20 years?

The popular answer is coal. After all, the famous Ruhr Basin is still one of the world's richest treasure chests of black diamonds. Economically extractable reserves are estimated at 25 billion tons of hard anthracite and 18 billion tons of soft brown lignite—more than enough to last well into the next millenium.

But coal has always meant pollution. Compared to nuclear energy, the sulfur and nitrous oxide emissions of coal-burning power and heating plants pose an infinitely greater immediate danger to the environment.

As it is, fossil-fuel combustion—both oil and coal—already emits more than 60 million tons of pollutants into the atmosphere over Western Europe each year. They come back down as toxic particles and the same corrosive acid rain that plagues the northeastern United States and Canada.

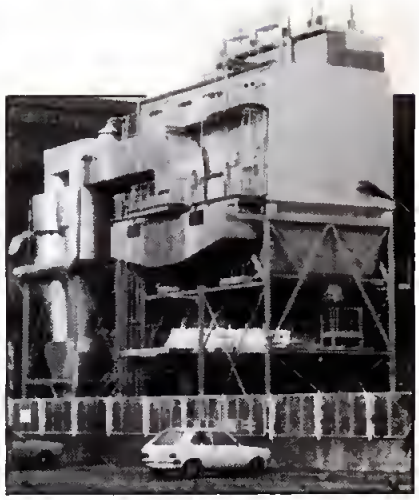
But how about a form of coal combustion that needs no filters because it desulfurizes the flue gases and also has virtually no emission of nitrous oxides?

West Germany's coal industry has come up with such a technique, suitable for power generation, as well as production of steam for district heating. Not only is it so environmentally clean that sulfur emissions could be reduced by more than 99 percent, but it is more efficient and cost effective than any conventional coal-burning system now in use.

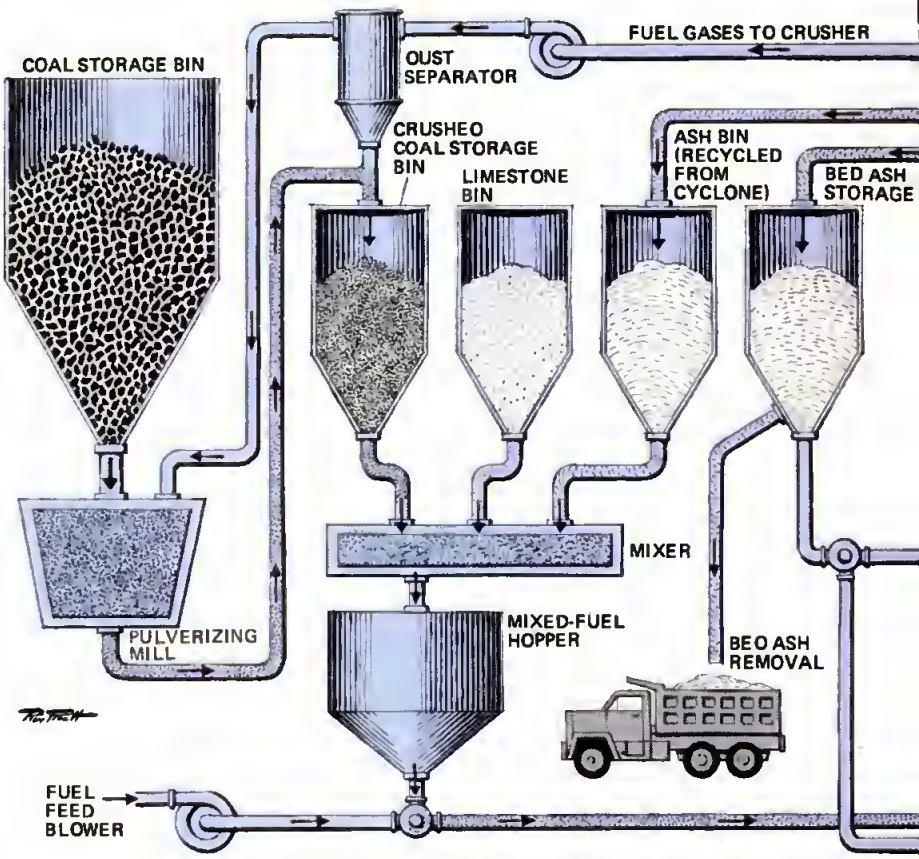
Based on the principle of "fluidized bed combustion," it was developed by engineers at Ruhrkohle A.G., the country's largest coal mining conglomerate, in cooperation with two leading engineering and boilermaking firms—Deutsche Babcock A.G. and the Thyssen-Standard Boilers consortium.

"Of course," concedes Hermann Krischke, project chief at Ruhrkohle A.G. in Bottrop, "the principle of the fluidized bed is hardly new. It's been known since the 1920s, when it was used for various catalytic processes and the calcination of pyrites. But it was rediscovered—as a means of coal combustion—after the first oil crisis in 1974."

At first glance, the principle seems relatively simple: Pulverized coal is mixed with a certain amount of forced air to lubricate it and make it flow like a fluid. In the process developed by Krischke's team, coal, crushed to fine grains, measuring about 6 millimeters in diameter, is fed into the burner. Simultaneously, the combustion air is blown into the chamber through a perforated distributor plate. The air churns the coal into an eddy about 3 feet high. This is called the "bed" and it behaves, physically, like a boiling liquid



Germany's largest fluidized bed combustion power plant is 35-megawatt burner at Flingern, near Düsseldorf.



while it burns. That makes for more even temperature distribution and provides very high thermal efficiency. The heating surfaces—water pipes to produce steam—are immersed directly into this swirling eddy in order to provide optimum transfer of heat.

"Because of the high heat transfer coefficient," says Krischke, "combustion can be kept at 800° to 900° C., instead of the 1,600° you have in conventional systems. As a result of the lower temperatures, there is virtually no formation of nitrous oxides.

"Even more important than that, crushed or pulverized limestone can be mixed with the coal to act as a desulfurizing agent. At temperatures ranging from 800° to 900°, the limestone is converted into calcium oxide and combines with the sulfur dioxide that is released from the coal to form calcium sulfate—that is, gypsum. The gypsum becomes part of the residual ash which can be used as an aggregate for building materials.

In theory, SO_2 emissions could be eliminated almost totally by the process, depending on how much limestone is added, and on several other factors. For all practical purposes, though, a ratio of 8 to 10 percent limestone suffices to reduce SO_2 emissions by 80 percent—enough to call the flue gas "environmentally clean" and meet even the strictest pollution-control standards now in effect.

There are other important benefits besides clean combustion, as well. The thermal efficiency is very high—95 percent and more. That means very small heat-transfer areas are needed, which makes for compact burner and power-plant designs. Capital investment costs can be cut substantially. And operating costs are judged to be as much as 30 percent lower than in conventional systems.

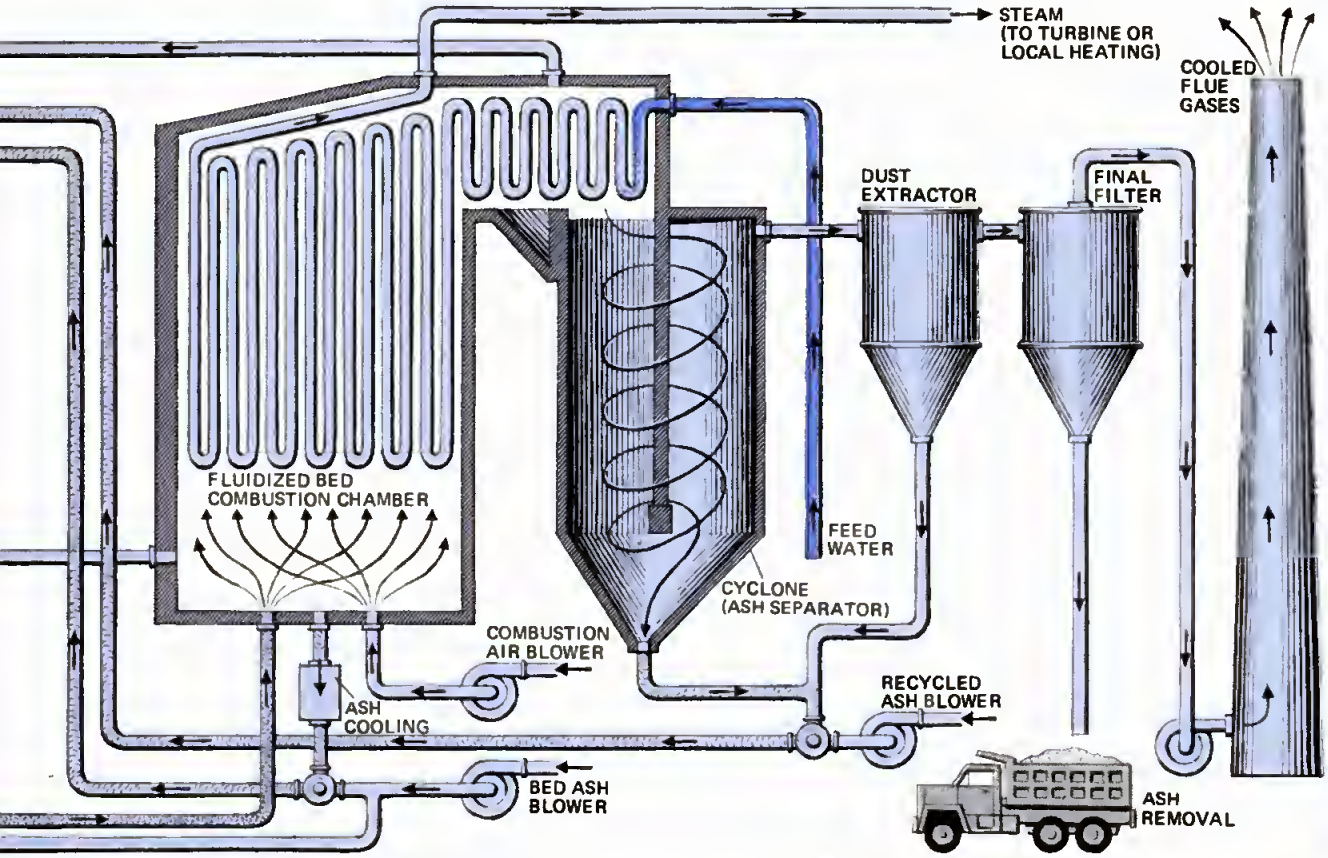
Moreover, even low-grade coal with a high ash or sulfur content and tailings of low calorific value can be converted into energy without the slightest pollution impact. That not only reduces the fuel costs, but saves reserves of higher quality coal.

As part of the development project, two prototype plants were built and have proven highly successful. A 35-megawatt unit, used as a combination electrical power and district heating station (see diagram) was set up by Ruhrkohle and Babcock in Flingern, a suburban district of Düsseldorf. A smaller plant, with a 6-megawatt capacity, built by the Thyssen-Standard Boilers consortium, was installed at Ruhrkohle's "King Ludwig" mine in the city of Recklinghausen to produce steam for central heating and industrial boilers.

Many additional plants are now under construction or on order. A 230-megawatt station is planned in Volklingen in the Saarland.

"The plant in Volklingen," says Krischke, "will be the first coal-burning power station in the world without a chimney. The flue gases, totally desulfurized, electrically filtered and cooled down to under 200° C., will leave via the cooling tower."

Editor: Robin Nelson
Contributor: John Dornberg

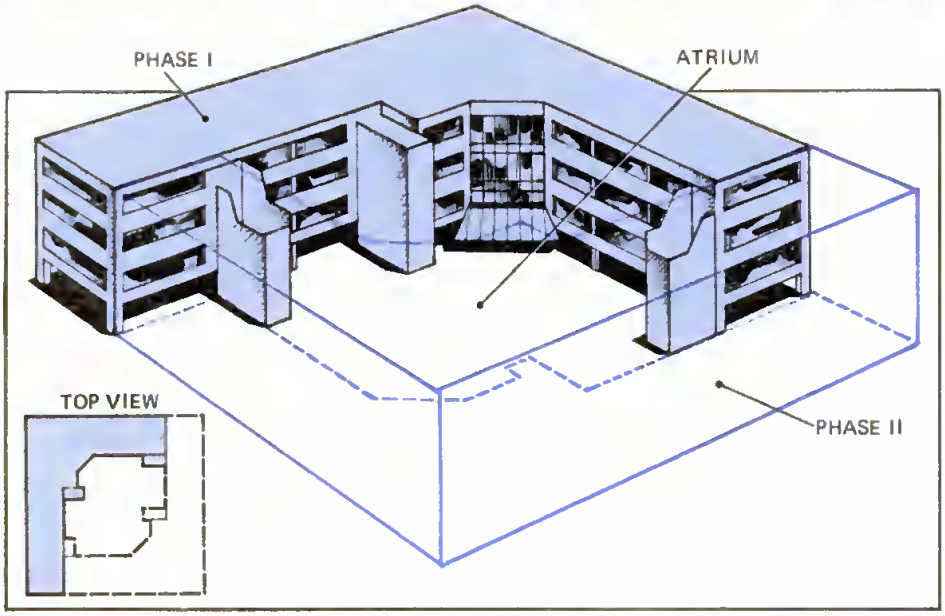


Architecture

The world is their atrium

A revived ancient Roman might feel right at home in the sunbelt South, where atrium style, rediscovered in Atlanta a decade or so ago, has become *the* architectural format for office buildings.

What's different about the atrium building going up at 405 North Reo St. in Tampa, however, is that for about a year, it is going to be "half" a building with its atrium open to the world.



Tampa's Zurn building: Half will be occupied, while half is built; eventually, they will join.

Designed by Tampa architect Warren Smith for Zurn Industries, a builder of cooling towers, the building is actually two buildings. Phase I is nearly completed, with occupancy by the owner (approximately 50 percent) and tenants close at hand. Phase II turns out to be a mirror-image, L-shaped building that will be constructed over the next year. When completed, it will be linked to its twin by the removal of demountable walls.

Construction techniques that include the demountable wall structures make it all feasible, says the architect. Although each side of the new building will require self-contained heating and air-conditioning systems, the economic advantage lies in being able to lease out half the building and get revenue from it, while the other half is being completed.

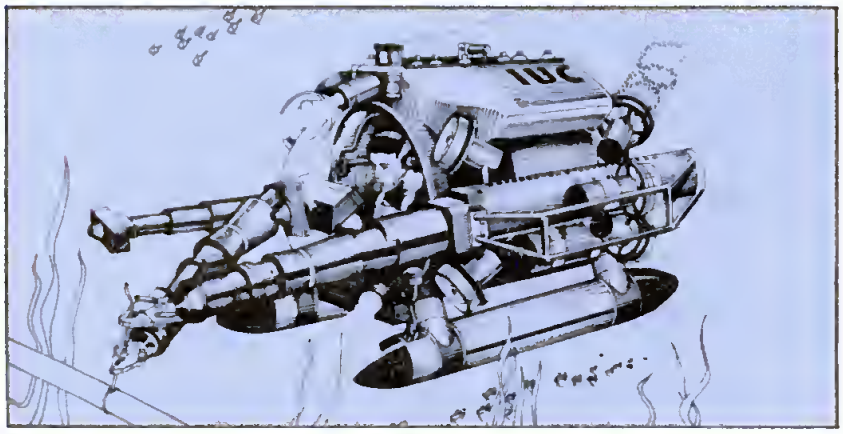
A skylight will cover the atrium after both phases are linked. A 20-foot open square in the center will admit natural sunlight.

Marine

Man as accessory

The Mantis Duplus is a one-atmosphere submersible evolved from a series developed by IUC International, the Bermuda-based diving concern. An optional third manipulator arm and stronger thrusters offer more reliability and versatility than previous models, but it's the multimode control that sets the Duplus apart from other Mantises.

It can go below on its tether to 2,300 feet—and the Duplus doesn't care if there is a man aboard or not. In its fully manned mode, a pilot steers the craft and operates all the equipment. In a semiremote mode, a surface operator with a television view can operate either the manipulators or the steering controls, leaving the other function to the diver aboard. This would prove helpful in areas of strong currents, for instance, where the pilot could concentrate on thruster control to hold position, while manipulator work was handled from above. In its fully remote format, all systems are controlled through a tether attached to a panel and video screen on the surface.



Mantis Duplus can be controlled from the surface, by its driver-pilot, or both ways.

Water-driven tools

After some six years in development, the Naval Civil Engineering Laboratory at Port Hueneme, Calif., has produced and tested hydraulic impact tools powered solely by seawater. The advantage over oil-driven tools now used by divers is that no return hose is required; seawater merely exits the tool. This cuts current drag on feed lines by half.

ME COLD? NEVER!

There are some people who love the cold and the wind—but I'm certainly not one of them. I used to try just about everything to stay warm—big coats, bulky sweaters, thermal underwear, the works. Somehow I still was cold or worse yet, sweating under layers of heavy clothing.

Then a friend told me about Damart Thermolactyl and I haven't been cold since! Indoors or out, this super-soft and lightweight underwear is a real miracle, as far as I'm concerned. In fact, you can turn your thermostat into the 60's without sacrificing any comfort.

The secret is the fabric. It retains and reflects my own natural body warmth. And it's knitted to let perspiration out! You stay warm and dry, no matter what the temperature.

I'm convinced Damart is the best cold weather wear there is. So are the Mt. Everest climbing expeditions. Damart is also worn by the Pittsburgh Steelers, Buffalo Bills, New York Jets and Philadelphia Eagles Football Clubs.

There's an exciting free color catalog that tells the full Damart Thermolactyl story and displays the whole Damart line for men and women, *including tall sizes*. Send for your FREE copy now!

A LIMITED WARRANTY TO CONSUMERS ★ Good Housekeeping PROMISES REPLACEMENT OR REFUND IF DEFECTIVE

THE PROOF IS IN THE WEARING!

Damart
Thermolactyl

WHEN IN THE BOSTON AREA, VISIT OUR PORTSMOUTH, N.H. STORE (603) 431-4700

THERE IS NO WARMER UNDERWEAR MADE!
Fill out and send to:

DAMART, DEPT. 11072
1811 Woodbury Ave.
Portsmouth, N.H. 03805

YES! Rush me your **FREE DAMART** Catalog . . . I want to enjoy the fantastic warmth of Thermolactyl Underwear, a DAMART® exclusive. (I understand there is no obligation.)

PRINT NAME

ADDRESS

CITY STATE ZIP

© 1982, Damart, Inc

FREE BLUEPRINTS and TRIAL LESSON
—for your greater success in Building

Beginners, craftsmen, even foremen and superintendents, have sent for these free blueprints and trial lesson in Plan Reading as a means of trying out Chicago Tech's home-study Builders training. Learn how you can master Plan Reading—Estimating—and the practical details of all types of construction in your spare time at home. Mail coupon below or phone TOLL FREE—see how you, too can prepare for a better job—higher income, or start your own contracting business.

• PHONE TOLL FREE (24 HRS.)
1-800-528-6050 Ext. 818
CHICAGO TECHNICAL COLLEGE
1737 So. Michigan Avenue, Chicago, Ill. 60616
THE SCHOOL FOR BUILDERS

CHICAGO TECHNICAL COLLEGE
Dept. PM-102 1737 So. Michigan Ave.,
Chicago, Ill. 60616
Please mail me a Free Trial Lesson, Blueprints and Builders Catalog. I understand there is no obligation—no salesmen will call.

NAME_____ AGE____
ADDRESS_____
CITY_____ STATE____ ZIP____

NEW!
24½ INCH BAND SAW
30-DAY FREE TRIAL!

Now, a pro-size, hand saw priced for the home shop! Big 24½-in. throat easily handles large scrollwork, complex curves, 4 x 8 sheets. 9-in. vertical cut makes it easy to resaw valuable hardwoods. Ball bearing construction. All-steel welded frame eliminates deflection. Includes motor, stand, rip fence, scroll table, full instructions. Send for complete facts today!

Call Toll-Free 1(800) 824-7888 Oper. 642
In California Call 1(800) 852-7777 Oper. 642

WOODMASTER TOOLS DEPT. SP3,
2849 TERRACE, KANSAS CITY, MO 64108

WOOD-FIRED
HOT TUBS
Lifetime Quality Redwood
No Power or Plumbing
Fast, Efficient, Fun
Easy To Assemble and Operate

FEATURING the SUBMERGED Snorkel™ Stove

COMPLETE OUTFITS FROM UNDER $1000

For Free Brochure and Price List Write or Call
The Snorkel Stove Co. Box 20068PX
Seattle, Wa 98102 (206) 523-9637

SINGLES, ANYONE? (Continued from page 92)

to have all these performance capabilities without the optional avionics package that lets you take full advantage of them. Reading the options list on some models, you get the idea that without the $40,000 in full radio/nav panel, plus autopilot and color radar, the stock airplane is little more than a powered hang glider with some added structural integrity. The funny thing is, the brochures are right. If a 300-hp, turbocharged airplane is to be fully and efficiently utilized at today's operating costs and in today's evolving electronic air-traffic control environment, it needs expensive navigation equipment.

To have paid up to $100,000 for airframe and powerplant alone only to sit sipping machine-made coffee on a hard chair in some Sleepy Hollow airport, while the fronts of summer thunder across the nation, would be an extremely bad situation. In addition, the FAA is bent on expanding the number of metropolitan terminal areas where any aircraft entering must be equipped with a transponder (radar identification) and must fly precise routes under positive control.

An underequipped airplane won't get the flight time it needs to pay off; fixed costs such as hangar rental, insurance, maintenance and overhauls gobble up money. At 300 hours per year flight time, a typical single-engine plane will cost about $10 more *per hour* of operation than the same model flown 600 hours in a year.

So while cramming a King RNAV system, a Century autopilot and a Sperry color weather radar into a small-plane panel might cost an extra $40,000, look what it gets you: Point-to-point flight (area navigation) by computer-generated waypoints—rather than having to fly from one VOR (radio homing) station to the next, along with the airlines. Weather avoidance—if you know where they are, those thunderstorms can be sidestepped. And the autopilot? In its most rudimentary mode, holding the wings level or maintaining a preselected altitude,

Airborne commuter taxis back to personal hangar at California's Cameron Airpark.

A plane in every garage

Companies struggling to sell the public on small planes wish that there were more communities like Cameron Airpark Estates in California. A small development nestled in oak-covered hills near Sacramento, it is peopled by diehard plane owners. Every home ($150,000 and up) has a hangar, a windsock on the roof and is connected by taxiway to the main runways of the community airport.

Street signs are only three feet high to prevent wing damage; all streets are 100 feet wide, allowing two cars and two aircraft to pass simultaneously (the middle lanes are reserved for cars).

Robert Arnold uses his plane more than his car, finds it cheaper going direct.

"I do more flying than driving," says Cameron resident Robert Arnold. With his wife, Irene, Arnold often packs weekend camping gear and folding bikes in his plane. "Flying direct," according to Arnold, "can be cheaper than driving."

it gives the lone pilot the time he needs to establish and cross-check complex navigational data. In its most sophisticated form, the autopilot can take over just after takeoff and, linked to the plane's navigation system, fly you to within 200 feet of your destination runway.

Bombs away

It is truly noteworthy, then, that these highly evolved, instrument-jammed, luxury single-engine airplanes are among the biggest bombs in a quiet disaster that is the general aviation industry in 1982. Singles account for an estimated 170,000-plus of the total general aviation fleet of 220,000. By June of this year, their sales were off more than 50 percent. By midyear, some of the biggest names in the small plane business had, discreetly, all but suspended production.

Why? The recession is an easy out, with interest rates one reason why fewer people might care to contemplate the giddy price tags being hung on small aircraft. Yet some industry executives admit that nobody has done a selling job worthy of the product. "Businesses are afraid of stockholders, afraid of the IRS," says one airplane marketer. "While the big boss can fly around in his conspicuously unmarked Learjet, if middle managers take off in a smaller plane, everybody reads it as 'having fun.' "

Another factor could be the unwillingness of some potential buyers to accept the fact that single-engine planes are as safe as twins. In their favor, singles must, by FAA edict, have a stalling speed—when the wings lose lift—of *no more* than 61 mph. If you want to walk away from a survivable aircraft accident, stall speed is one number that counts. Furthermore, while the situation has largely been rectified in later models, many twin-engine aircraft have a minimum speed at which control can be maintained with one engine out (Vmc) that's *higher* than the nominal stall speed. (In many light twins, this runs up to 10 mph higher than singles.)

The growing dependability of all types of general aviation engines, of course, works somewhat in the favor of singles in regards to the foregoing. Perhaps the awareness of the new versatility and range of small planes will grow as well, and a relative golden age can be hammered out after recovery. Some of us, in any case, will know what to do when we hit the state lottery for a big one. The yacht will have to wait. **PM**

Your home workshop can PAY OFF BIG!

This One Low-Cost Power Tool–

SAWS to desired Width...
PLANES to desired Thickness...
MOLDS all popular Patterns...

All at once or separately... All By Power Feed!

TRY THE FOLEY-BELSAW IN YOUR OWN SHOP
30 DAY FREE TRIAL OFFER

Only 3-in-1-Workshop Tool Of Its Kind!

From the Day It Arrives... Your Planer will make and save you money. With shortages and inflation driving lumber prices sky-high, this versatile power tool easily pays for itself by quickly converting low-cost rough lumber into high value finished stock. In just one pass turn out your own quarter-round, door and window stop, casing, tongue-and-groove... all popular patterns. Other Foley-Belsaw operators are making cases for grandfather clocks, furniture, picture frames, fencing, bee hives, bed slats, surveying stakes... all kinds of millwork.

Built For Pros... Priced For the Home Craftsmen

... it is engineered and built to industrial standards, but factory-direct selling keeps the price low. Handles tough oak and walnut as easily as pine, and so simple to operate even beginners with no experience can use it.

NO RISK 100%
Guarantee of Satisfaction

"Try the Foley-Belsaw in your own shop for a full 30-Days and put it to work for you. Give it a thorough test and make it prove that it can do everything we say it will . use it as much as you want. Then if you are not completely satisfied, just send it back and we'll return every penny sent with your order. And YOU are the sole judge. There are no questions asked... there are no fine print 'use' charges. Our flat guarantee is that YOU must be 100% satisfied or you get your money back."

Start Your Own Business
Earn Extra Income Right at Home

With just this one low cost power-feed machine in a corner of your garage or basement, you can set up a profitable business by supplying lumberyards, cabinetmakers, carpenters, remodelers, contractors and hobbyists in your area with custom-planed lumber, trim, molding...ALL of their millwork requirements. Supply picture molding to art shops, hardware and department stores, or sell direct to framing shops. All standard patterns in stock...custom knives ground to your design or sample.

Does The Foley-Belsaw Pay? YOU BET!

READ WHAT OTHER FOLEY-BELSAW OWNERS SAY:

A Good Investment: "I believe that the Planer is the best investment I ever made. I've been a planer man for years and am now retired. The Foley-Belsaw has earned me over $60,000 extra income in the past eleven years."
Robert Sawyer, Roseburg, Oregon

Pays For Itself: "I bought a batch of walnut in the rough, and after planing it on the Foley-Belsaw I figured up the money I had saved. It was enough to pay for two-thirds the cost of the Planer. It really does a good job."
R.S. Clark, Springfield, Ohio

More Than Expected: "This machine pays for itself by making money out of scrap boards. It is a very well built machine and I contess it is more than I expected for the price. It does everything you say it will."
Stephen Schultz, Orangeville, Penna

... And Foley-Belsaw Is The Choice Of Professionals: "I recommend Foley-Belsaw's Planer-Molder-Saw as the most useful shop tool that any craftsmen could own. We use ours every day in the WORKBENCH model shop, and couldn't get along without it."
JAY HEDDEN — Editor of WORKBENCH Magazine

FREE BOOKLET!
Get FREE Book with facts and full details...RUSH COUPON TODAY!

If coupon has been removed just send postcard with name and address to

FOLEY-BELSAW CO.
90041 FIELD BLDG.
KANSAS CITY, MO. 64111

NO OBLIGATION and NO SALESMAN Calls!

SEND FOR FREE BOOKLET

FOLEY BELSAW
Foley-Belsaw Co.
90041 Field Bldg.
Kansas City, Mo. 64111

☐ **YES**, please send me the FREE Booklet that gives me complete facts about your Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No Salesmen will call.

NAME
ADDRESS
CITY
STATE ZIP

WOODWORKERS Do-it-Yourself CATALOG

with 20 WOOD SAMPLES

104 giant pages —14 kinds cabinet and furniture woods, 79 veneers in 3-ft. lengths, 19 flexible veneers to 36" wide x 8 ft., 11 fancy burl & crotch, 54 sizes, kinds carving blocks, 76 assembled inlays, 72 lamp parts, 39 clamps, 118 carving tools & chisels, 73 wood picture kits, 500 plans, 96 how-to books. Pic. framing, carved molding, period hardware, sliding, revolving hdwe. Cane, reed, wood finishes, coffee mill kit, clock parts, etc. Over 2,000 hard-to-find products in new Woodworker Catalog!

TEAR OUT AD. MAIL TODAY.

CONSTANTINE Est. 1812
2051 Eostchasrar Rood, Bronx N.Y. 10461

☐ Enclosed $1 for Catalog without samples.

☐ I prefer Catalog with 20 Wood Samples. $2 enclosed. Send 20 wood veneers from around the world. Identified. Useful when matching, naming & ordering fine woods. Educational. $1.50 refunded on first catalog order.

Name _____

Address _____

_____ Zip _____

BUILD THIS ACCURATE PANEL SAW FOR LESS THAN $49*

Complete Plans $3.95 + 60¢ Postage & Handling. Send Check or Money Order To: WORKS DESIGN, Box 307, Narthgate Station, Seattle, Wa. 98125

Money Refunded If Not Satisfied Wash Residents Add 6 5% Sales Tax * Saw not included

SWISS ARMY TYPE KNIFE

All purpose wonder knife Red handle Sturdy survival knife with 12 Stainless Steel Blades per fect for fish ing, camping, work and play Guaranteed

4.50 ea.

Add 50¢ Post & Handl

Westbury Sales P O Box 434, 373 Maple Ave Westbury, N Y 11590 Dept E-10-PM

"Kerosene Heater Headquarters"

- Mail order discounts
- VISA/Master/COD
- Immediate Service UPS
- Catalog Call Toll Free
- 1-800-458-3474
- In Pa Call 1-814-943-2535

KERO-STOVE SALES CO.
P O Box 651, Altoona, Pa 16603

DRIVING THE '83 CHRYSLERS

(Continued from page 104)

and about two mpg less with the more powerful 2.6 engine.

Standard in the very plush interiors are a "message center" instrument cluster, a new three-mode heater system with "ram air" outlets and a center armrest front bench seat. Optional is a 50/50 split bench with individual armrests and built-in consolettes. Each consolette contains a seat recliner lever and a small-item stowage compartment.

The E Class and 600 also come with a much improved (over previous K-based cars) power front disc/rear drum brake system, power steering, halogen headlamps, a locking fuel filler door, an electronic deck release and a new "easy-close" counterweighted decklid design.

In driving the E Class and the 600, we found them thoroughly pleasant, comfortable and competent luxury/family sedans with no major vices or, for that matter, outstanding virtues. Performance from the much improved 2.2-liter engine is more than adequate even with the standard automatic gearbox, and ride and handling are what you'd expect from domestic fwd cars in this class—soft and not very sporty.

Exciting newcomer

But hold on. There *is* one exciting car in this new line. It's called the Dodge 600 ES (for Euro-Sport?) and comes with a new *five-speed* manual transmission, a special sport handling suspension, Goodyear Eagle GT tires on styled aluminum wheels, blackout trim, high-back reclining bucket seats, console, sport steering wheel and "talking dashboard."

Except for the incongruous (very *un*-European) fake fender vents and the stand-up hood ornament, the 600 ES *looks* the part of a European performance sedan—and it even drives like one. The five-speed makes the willing little engine come alive and the big tires and very competent suspension make it feel and handle like, say, an Audi 5000. The whole effect is to magically transform the nice but mundane 600 into a whole different car for a whole different kind of driver—one who really enjoys driving.

The five-speed also boosts the ES's rated fuel economy to a very respectable (for this size car) estimated 24 mpg city, 38 highway. If you're not into manual shifting, though, you can get the rest of the ES package wrapped around an optional automatic transaxle. You can also get it bolted to the 2.6-liter engine—but not with the five-speed.

Also new is Plymouth's Scamp version of the delightful Rampage sport minitruck. Available in basic Scamp and racy GT variations, this little hauler comes with the higher output 2.2 engine and four-speed transaxle (or optional automatic).

Like its Dodge Rampage twin, the Scamp is a ball to drive and even semi-useful as a load carrier. It offers amazingly gutsy performance along with excellent fuel economy and superb cornering capability. And for '83 the little pickup's braking ability is much improved with a new load-sensing rear brake proportioning valve that adjusts front-to-rear balance according to weight distribution.

The excellent Mitsubishi-built Plymouth Sapporo and Dodge Challenger coupes are far from new, but both offer a new "Technica" option package that's a real electronics buff's dream. On the instrument panel are a digital speedometer, a graphic LED tachometer shaped like a torque curve (similar to that in the Toyota's luxury Celica Supra) and heater/ac flow indicators that change color with air temperature.

Stylish base cars

The small fwd Omni and Horizon lines have been simplified and generally upgraded for '83 with the strippo Miser models dropped and *very* nicely trimmed and equipped base cars—you'll never believe they're "base"—taking their places. Top-line versions are simply called Custom. Similarly, the TC3 and 024 designations are discontinued and the aerodynamic sporty coupes are now just Plymouth Turismo and Dodge Charger—or "2.2s" with the zippy performance package.

A 1.6-liter Four, purchased from Chrysler's French partner Peugeot, will be phased in as base engine for these cars as the 1.7-liter VW Four is phased out. Offering comparable performance and economy with lighter weight and better accessibility in the engine compartment, it generates 62 hp at 4,800 rpm and in the five-door hatchback sedan should deliver 34 mpg EPA city and 50 highway.

In addition, as we mentioned, Chrysler's own 2.2-liter Four is substantially upgraded for '83. Mostly due to improved electronic spark and fuel controls and better intake and exhaust flow, it offers 10 more horsepower (94@5,200 rpm) than last year's 2.2, and two to three more mpg besides. As optional powerplant in the Omni/Horizon sedans, for example, it gets 29 mpg city and 45 highway EPA ratings when teamed with the new five-speed. PM

DRIVING THE '83 AMC CARS

(Continued from page 106)

wheel economy car from the hordes of similar transportation modules that issue from every corner of the globe at prodigious rates. From the back it looks like a Corolla. From the front it looks like a Jetta. And from the side it looks like a toolbox.

Vive la différence

What does set the Alliance apart are its bolt-on front subframe, its transverse torsion-bar rear suspension, its relatively long wheelbase for so short a car, the rocking-chair pedestal front seats, and a couple of its options, like the infrared, keyless entry system and the dashboard vital fluids monitor.

The bolt-on front subframe borrows technology pioneered by Mercedes and Opel. You usually don't find subframes on inexpensive econocars, but the Renault benefits—as do other cars that use it—from better road and engine isolation.

As for the rear suspension, it's the trailing-arm type, but with one important difference: Instead of the usual coil springs, the Alliance uses a single transverse tube that houses torsion-bar halfshafts—one half bar per side. It's one of the most space-efficient rear suspension setups devised to date.

And, by the way, the Alliance uses suspension stabilizer bars front and rear, which improves cornering.

The car's relatively long wheelbase (as related to overall length: 97.2/163.8 inches vs. 94.5/167.3 for the Nissan Sentra), plus its rather small wheelhouses make for more room in the interior.

Pedestal front buckets, introduced last year on the Renault Fuego, increase rear legroom by letting rear riders stretch their feet forward alongside the two seat pillars. Meanwhile, the buckets themselves have six-way adjustments.

Finally, we come to those two gee-whiz gadgets that Alliance offers optionally. These are only two among many more conventional options that include power steering, five-speed manual and three-speed automatic transmissions, power door locks, air, cruise control and tach.

The two innovations are what AMC calls its Infrawave Locking System and its Systems Sentry.

The Infrawave Locking System gives you a key fob with a tiny battery inside it. When you point the fob at the car and push a button on the unit, an infrared light beam zaps a sensor on the instrument panel, and solenoids lock or unlock the doors.

The Systems Sentry mounts just to the right of the driver's windshield pillar and has a battery of warning lights. The device monitors all the engine's vital fluids, from oil level to coolant to power steering, transaxle, washer, and so forth.

Under the hood, the Alliance reads like a textbook economy car. It uses the same 1.4-liter, square (same bore and stroke dimensions) pushrod Four as LeCar, but with either throttle-body fuel injection on 49-state models, or Bosch multipoint injection for California. The engine seems more refined and less buzzy than the LeCar motor, especially at high rpm. And, of course, the engine lies crosswise, unlike LeCar's.

Early EPA estimates put fuel mileage at 36 mpg city, 50 highway.

Looking at the rest of the AMC/Renault lineup, you'll find all the familiar nameplates: Concord, Eagle, Spirit, Jeep, Fuego, 18i and LeCar back on the scene for '83.

The Concord series is squeezed down to two models—a four-door and wagon. Also chopped from the line are the Spirit sedan and Eagle two-door. This leaves just the Spirit Liftback model and the Eagle SX/4, four-door and wagon models to carry the AMC pennant into '83.

Concord and Spirit models now have the 4.2-liter, 258-cu.-in., six-cylinder engine as standard.

Eagle vehicles still use the Pontiac Iron Duke 2.5-liter, 151-cu-in. Four as the base powerplant. The Six can be checked off on the factory option chart. Eagles motivated by the four-banger will have more spirited performance due to higher rear axle gearing. The '83s use a 2.73 gearing compared to '82's 2.35.

Jeep

Changes in the Jeep brigade are relatively minor. Engine mods for the six-cylinder passenger cars also carry over to like-powered Jeeps.

Renault

Remember how confusing those three stalks were on the steering column of the 18i and Fuego models? Well, both models have been destalked by one.

In other changes, the 18i comes only as a deluxe model equipped with a standard five-speed transmission. The final drive ratio has been toned down from 3.78 to 3.44.

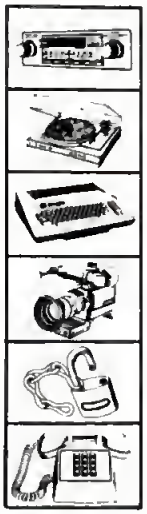
The Fuego gets the Infrawave keyless entry system and a locking fuel filler door is thrown in when you order power door locks.

Those thrifty LeCars are now even stingier on a gallon of gas. A final drive gear ratio change from 3.63 to 3.10 is the benefactor. Driving fun is reduced proportionately. PM

FREE

CATALOG

FAST SERVICE
DISCOUNT PRICES
30-DAY SATISFACTION GUARANTEE



CAR STEREO
HOME STEREO
PERSONAL COMPUTERS
VIDEO SYSTEMS
SECURITY ALARMS
TELEPHONE EQUIPMENT

SEND COUPON OR CALL TOLL FREE

800-446-1640

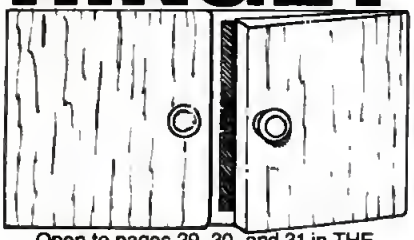
In continental U.S., Puerto Rico and Virgin Islands.
In Virginia call toll free 800-552-3961.

☐ Send me your free catalog by Third Class mail.
☐ Rush me your free catalog. I'm enclosing $1 for First Class mail.

Name
Address
City
State Zip

CRUTCHFIELD
1 Crutchfield Park Dept G, Charlottesville, VA 22906

HOW CAN YOU SEE A FULLY CONCEALED HINGE?



Open to pages 29, 30, and 31 in THE WOODWORKERS' STORE catalog for the finest selection of fully concealed, semi-concealed, and decorative hinges. But don't stop there, we have over 3,000 woodworking products.

Name _____
Street _____
City _____ State _____
Zip _____

The Woodworkers' Store™

Send $1 (3rd Class) or $2 (1st Class)
DEPT. E710
21801 Industrial Blvd.
Rogers, MN 55374

MOLDS

for making Ornamental Concrete Items...

Book about Aluminum Molds with prices and production trade secrets direct from world's largest mold manufacturer.

SEND $5.00

CONCRETE MACHINERY COMPANY, INC
P. O. BOX A99 · HICKORY, N. C. 28601

America's Quality Kits For Over 50 Years!

Build a grandfather clock handcrafted, semi-assembled, by grandfathers in cherry, walnut, oak or mahogany. Kits include beveled glass. Choose tubular bell or rod chime movements, with spun brass Lady Florentine or Goddess Diana Lyre pendulum. Hand painted moon wheels. Write for free descriptive literature.

Kuempel Chime Clock Works
Dept 50921195 Minnetonka Blvd., Excelsior, MN 55331

FINE NEW FIBERS

(Continued from page 109)

high mountains where it's too cold to rain and snow just dusts off your clothing—wetness should not be a problem.

However, Everest climber John Roskelley tells about a week of zero temperatures at high altitude when clothing was soaked with sweat from climbing. While testing sleeping bags using Quallofil, Du Pont's latest polyester fiberfill, Roskelley found clothing could be dried with body heat inside the sleeping bags every night without the Quallofil insulation absorbing the moisture or losing its loft or warmth.

Warmth without bulk is from 3M Thinsulate in leather Robert Comstock parks, pants.

First, to produce fibers only one or two microns (millionths of an inch) thick compared to regular 25-micron polyester fiberfills, 3M found the ultrathins had special insulating properties and introduced Thinsulate several years ago. Because surface friction seems to hold air layers around the tiny filaments, less loft is needed and body warmth can be retained without the usual puffy look of down insulation. (Geese and ducks apparently keep up a comfortable core temperature and streamlined look without excessive fluffing up.) Thinsulate has made possible less bulky ski clothes and, because the material maintains warmth retention while under compression, it is now being used in gloves and boots, as well. The 3M product, unlike most synthetic insulators made from polyester, uses the olefin compounds of polypropylene for a compression-resistant Thinsulate and the addition of polythylene where the insulation is less likely to be compacted.

Trim and light insulation in Wilderness Experience vest is with Eastman KodOlite.

Du Pont's new developments to keep us warm have been approached in a different way. To get more insulating air into the batting layer, they turned the solid polyester filaments into tubes that lighten the weight of the fiber while increasing its air-holding ability. Hollofil is the name of the product. Du Pont's micro-thin fiber is called Sontique and is designed for insulation in thin-silhouette clothing such as ski wear.

Latest of the Dacron fiberfills from Du Pont is just appearing on the market: Quallofil. It is similar to Hollofil, but Quallofil has four tubes inside every fiber to increase the amount of insulating air even more. The material is also reported to regain its full loft quickly after compression. Hollofil is used, in addition, for weaving the new warm and quick-drying pile materials such as Evervel and Borglite.

Developed by Celanese and produced by Reliance Products in Oakland, Calif., Fortrel PolarGuard has earned a loyal following as the polyester fiberfill that has continuous filaments. This means that PolarGuard clothes, sleeping bags, and even insulating curtains can be made without any need for quilting, and the new, siliconized PolarGuard has an even softer feel.

And from the Eastman Chemical Products Div. of Kodak come three types of Kodel polyester fibers. They are KodOfill, tubular filaments crimped for extra loft; new KodOsoff that has additional softness, loft and resilience; and KodOlite, with microfine fibers for light and trim insulation.

Forecast: Cold is on the way, but the new fibers should make for a warmer winter. PM

2nd MOST IMPORTANT TOOL FOR EVERY WOODWORKING SHOP

VERSATILE
W&H
MOLDER-PLANER

Almost as basic as your saw . . . molds, planes, rabbets.

From $430

- Master Charge
- VISA

FREE BROCHURE

WILLIAMS & HUSSEY MACHINE CO.
Dept. 17, Milford, N. H. 03055
Toll-free 1-800-258-1380

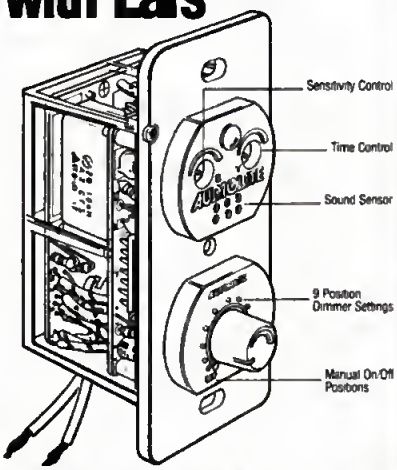
Brodrick's
Tool and Hobby catalog

A unique collection of quality tools for woodworking, home repairs and workshop. Special selections of hobby tools & kits, pre-packaged hardwood and How-To books. From BRODHEAD-GARRETT, prime manufacturer/distributor since 1903. Limited copies. To reserve your FREE CATALOG, write or call

TOLL-FREE **800-321-6730**
(IN OHIO 800-362-8915)

Brodrick's Dept. 122, 4560 East 71st St.
Cleveland, Ohio 44105

Protect your home with
AUDIO LITE
"the Light Switch with Ears"



Imagine a light switch that hears you coming and turns on the lights. Flicks off when room is empty. Frighten intruders. Save energy. Try one. You'll want to replace all your conventional switches with AudioLite. Solid-state microcomputer circuitry. Satisfaction guaranteed or return for full refund. Check, money order, M/C or Visa accepted.
Single AudioLite $34 ($2.50 Ship. & Hdlg.)
Set of **4 AudioLites $99** ($4.50 Ship. & Hdlg.)
Set of **12 AudioLites $269** ($5.50 Ship. & Hdlg.)
N.Y. Res. add sales tax

Order Now _____

REM SECURITY, INC.
27 East 20th Street
New York, N.Y. 10003
212-533-0801
800-221-6734 Out-of-state

Think of the MONEY YOU CAN MAKE...

When You Buy Merchandise Like This At Prices Like These!

LCD Sports Watch — Sells For $9.95 · Your Cost $3.95 · Your PROFIT $6.00

Deluxe Chain Burglar Alarm — Sells For $3.95 · Your Cost $1.30 · Your PROFIT $2.65

Solid Brass Musical Unicorn — Sells for $21.95 · Your Cost $6.90 · Your PROFIT $15.05

Genuine Diamond Ring — Sells For $19.95 · Your Cost $4.95 · Your PROFIT $15.00

Lock-Blade Knife — Sells For $3.95 · Your Cost $1.30 · Your PROFIT $2.65

PLUS! 2,496 more fast-selling big-profit items shown in our exciting 100-page full-color catalog.

PLUS! Detailed step-by-step plans that show you exactly how to sell our merchandise 21 different ways . . . from *Mail Order* to *Swap Meets, Fund Raising* to *Party Plans*. Part time or full time from your home.

PLUS! Every printed promotional piece and selling aid you need to make any plan work to perfection.

PLUS! Complete directions explaining how to set up and run a business — covering everything you need to know to make instant profits.

PLUS! Always-available business counsel, new selling ideas, additional merchandise and special extra-discount bonuses.

Sell by Mail!

Take the 1st Step Toward A Business of Your Own . . . MAIL THIS COUPON!

SMC Specialty Merchandise Corp. Dept. 300-22
6061 De Soto Ave., Woodland Hills, CA 91365

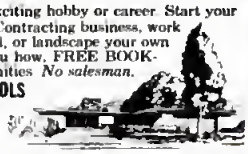
FREE Tell me about your 2,500 items which I can purchase at your amazingly low prices. Also send me information on your 21 home business plans. No cost or obligation, of course.

Name _____
Address _____
City _____ State _____ Zip _____

Learn LANDSCAPING

TRAIN AT HOME for exciting hobby or career. Start your own spare or full time Contracting business, work in Garden/Nursery field, or landscape your own property — we show you how. FREE BOOKLET describes opportunities. *No salesman.*

LIFETIME CAREER SCHOOLS
Dept. A-16
2251 Barry Ave.,
Los Angeles, CA 90064



CALL TOLL FREE NOW!

AMAZING VINYL REPAIR
—$10 to $20 in an hour!

Big earnings, repeat business. Car shops, homes, motels, restaurants, bars, etc. FREE FACTS BY MAIL.

Call toll-free 800-621-6633 (Ill. 800-572-0444) or Write VIP, 2021 Montrose, Dept. 181, Chicago, IL 60618

LEARN
MEAT CUTTING

Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full-time jobs — HAVE A PROFITABLE MARKET OF YOUR OWN! Time payment plan available. Diploma given. Job help. Thousands of successful graduates. OUR 59th YEAR! Send NOW for a big new illustrated FREE catalog. No obligation. G.I. approved. **NATIONAL SCHOOL OF MEAT CUTTING, No. 71-02-0197T,** Dept. 50 G, 33 N. Superior, Toledo, Ohio 43604.

Telephone Listening Device

Record telephone conversations in your office or home. Connects between any cassette or tape recorder and your telephone or telephone LINE. Starts automatically when phone is answered. Records both sides of phone conversation. Stops recorder when phone is hung up. This device is not an answering service.

size 1cu

Each $19.95
Qty. Disc. Avail.

Super Powerful
Wireless Mic

size 2 x 3 x

10 times more powerful than other mics. Transmits up to ¼ mile to any FM radio. Easy to assemble kit. (9V battery (not incl.)

Call (305) 725-1000 or send $19.95 + $1.00 shipping per item to USI Corp., P.O. Box PM-2052, Melbourne, FL 32901. COD's accept. For catalog of transmitters, voice scramblers and other specialty items, enclose $2.00 to USI Corp.

STAINED GLASS

Send $1.00 for fascinating catalog of kits, tools, ideas, books and supplies.

BIG STARTER KIT
Only $17.95 ppd.

WHITTEMORE,
BOX 2065EM, HANOVER, MASS. 02339

REPAIR OR MAKE CLOCKS

BATTERY QUARTZ MOVEMENTS

HAVE FUN! EARN EXTRA INCOME!

2 Year Guarantee! Free Hands With Each Movement!

SUPER CS SERIES QUARTZ BIM BAM BATTERY MOVEMENT

- With or Without Pendulum
- Ticking Sound
- Smaller Case
- Fits Many Style Clocks
- Two Chime Rods

CS - ND PENDULUM
1-2 $25.00 each
3-9 $22.95 each

CS-10-12-14-16 lengths WITH PENDULUM
1-2 $26.95 each
3-9 $25.00 each

LOWEST PRICES VOLUME DISCOUNTS LARGE SELECTION OF DIALS, ACCESSORIES, ETC.

CALL TODAY
(414) 248-1150

TM
KLOCKIT
P.O. Box 629, Dept. PM102
Lake Geneva, WI 53147
(Include $2.00 for minimum delivery charge)

FREE CATALOG
(Include 75c for 1st class delivery)

Q SERIES MINI QUARTZ

MADE IN USA
GERMAN DESIGN

Q70 for dials up to 3/16" thick
Q71 for dials up to 1/4" thick
Q72 for dials up to 3/8" thick
Q73 for dials up to 3/4" thick

TWO YEAR GUARANTEE

1-4 $6.60 ea.
5-9 $6.10 ea.
10-24 $5.10 ea.

Write for Quantity Prices
Sweep Sec. .20 extra

THE HANSOLAR TA-3

Now...an affordable solar heating system the U.S. Government will help you buy.

- Reduces fuel bills • Low purchase price
- Federal Government returns 40% of price to you
- Eligible for State tax credits • Simple to install
- Fully automatic, no maintenance • 5 Year Warranty.
- Winter-proven in Maine for homes, offices
- Modular system, easy to add on to

Mail coupon today for FREE Hansolar Information Kit plus home Solar Siting Test.

HANSON ENERGY

Hanson Energy Products, Dept.112, Newcastle, ME 04533

Here's all the money you need to put down on a new Miles home:

$0.00

NO DOWN PAYMENT

No money down below market financing low monthly payments It's not too good to be true—just too good to be passed up We provide step-by-step instructions and precut materials Join 20 000 happy homeowners who have gotten into the housing market the Miles do-it-yourself way

Please send me (check one or both)

☐ Free color brochure

☐ Miles catalog (Please enclose a $3 00 check or money order)

The Charleston

Mail to: Miles Homes, 4700 Nathan Lane, P.O. Box 9495, Minneapolis, MN 55440

PHONE NUMBER ( )

NAME

ADDRESS

CITY COUNTY

STATE ZIP

You're Miles ahead with no down payment

Miles Homes™ DIVISION OF Insilco

MPM1-1082

BEST STEREOS

(Continued from page 96)

full output) remains imperceptible.

The tuner section of the receiver is nondigital; however, it holds FM stations firmly in tune. Sensitivity suffices for most urban and suburban locations, especially with an outdoor antenna.

The little Boston Acoustics A40 speakers (small size is an important cost factor in loudspeakers) are a bit skimpy at the bottom. But within the available range, response is flat within 3 dB from 70 to 20,000 Hz. This exceptional smoothness of response—seldom achieved even in far more expensive speakers—nearly makes you forget that the lowest notes are weak. Besides, the bass of the A40s is so tight and well controlled that you can crank up the bass boost on the receiver without making the sound boomy. That way,

The Ohm Walsh 2 speakers feature a unique, inverted cone radiator that contributes to their excellent response and sound.

you get a very pleasing tonal balance, even for a full orchestra.

High-frequency response of the whole system is outstanding, with every tonal detail projected clearly and naturally. The tweeters scatter the highs over a broad angle (roughly 90° without perceptible off-axis loss), giving the system the kind of spacious sound usually associated with far costlier speakers.

The platter of the Technics SL-B202 belt-driven turntable spins without audible rumble, even with volume and bass boost way up. The tone arm tracks at minimal stylus pressure and the automatic return puts the arm to rest at the end of a record.

The Technics RS-M205 cassette deck is rather basic, but the sound is good. Flutter and wow are just 0.05 percent; signal-to-noise ratio with Dolby B is 66 dB; and frequency response (with Type II tape) extends to a very respectable 16,000 Hz.

Here, in sum, is a budget system to rival the performance of many systems costing twice as much.

'Playroom'

There's nothing middling about this middle-class rig. With 30 watts per channel, Sansui's R-606 receiver puts out convincing orchestral sound or gut-throbbing rock bass. And the sturdy and remarkably efficient AR-38 speakers can take anything the receiver dishes out and project it with full force. Here's a system capable of doing justice to any kind of music.

There's enough power to fill a large room with concert-level sound, yet the softest whisper comes through with startling clarity against a virtually silent background. To sum it up, this system is a bargain at the price.

Even so, we won't pretend that our "Playroom" rig is without compromise. The point is that the designers of these components have chosen their compromises wisely. With evident intelligence, and maybe a bit of luck, they've managed to shave costs precisely at those points that least detract from the experience of the music.

The particular components we picked offer not only excellent performance, but also an array of advanced operating features and conveniences. For example, the Yamaha P-751 direct-drive turntable has automatic start and cuing, as well as automatic tone-arm return and stop.

Sansui's R-606 is fully digital, assuring the ultimate in tuning precision. Up to 12 station frequencies can be stored in memory and summoned up at a single touch. What's more, there's a scan mode which searches out available stations, and the THD of this unit is a commendable (and inaudible) 0.07 percent.

As for the Dual C-814 cassette deck, it's the product of a company noted for its outstanding turntables; it has the feel of being built to tight mechanical tolerances. A particularly useful feature is the automatic tape selector, which senses the type of cassette placed into the loading slot and automatically adjusts bias and equalization.

A lot of experienced listeners feel that components in the mid-price bracket give the highest return of pleasure for each dollar spent. The components listed here give added evidence for this opinion.

'Penthouse'

If the "Playroom" system is so good, why move up to the "Penthouse"? For starters, our top-of-the-line system can burst forth into great cascades of symphonic sound without any audible trace of effort, lay a deep foundation of solid bass under the musical structure and remain unfazed even by the earthquake notes of a great pipe organ. Also, it's turntable is so quiet that no rumble obtrudes, even with extended bass response and a sound spread so spacious that your living room will sound like a concert hall. Add to this an FM tuner that does more tricks than a trained monkey and a cassette deck with elaborate refinements, and you've got a good picture of our top-rank choices.

The Thorens TD-105 Mk II belt-driven turntable is an outstanding example of Swiss-precision mechanics. It's exceptionally quiet and the automatic return of its ultralight tonearm is activated by a velocity sensor that puts no mechanical drag on the motion of the arm.

All-time tracking champ

I haven't said anything about the phono cartridges in the other systems, because there wasn't much to say. They do their jobs and do them well. Here, however, we picked the Shure V-15 Type V, which may well be the world's finest cartridge. Its response is as flat as a mirror, and a dynamic stabilizer helps the cartridge ride out the ups and downs of warped records without any audible thumps. We played some grueling test records with it and we're convinced it's the all-time tracking champ.

As for the receiver, Sony's STR-VX6 is one of the most advanced and sophisticated audio items ever designed. At 70 watts per channel, it packs as much power as anyone is likely to need in a home, even if he likes his music to register on the Richter scale. Distortion is a spectacular 0.006 percent THD—almost too small to be measured. This is the result of Sony's exclusive "legato linear" circuit, which cuts down so-called switching distortion between each half-cycle of the waveforms to be amplified.

The tuner section incorporates the "direct-comparator" circuit, a new development which yields extremely quiet background, even with relatively weak signals. This makes the STR-VX6 ideal for fringe areas.

The digital front end allows for 16 memory presets. In addition, there are three separate scanning modes: The unit scans up or down the dial for the next station and holds it. Or it can hold the scanned station for 4 seconds, then move on to the next. The third scanning mode scans only those stations which you have preset in memory. As an added option, you can restrict the scanning in any mode to only those stations strong enough to come in clearly.

Onkyo's TA-2070 cassette deck, aside from being a superb performer is equally feature-laden. Offering the new Dolby C noise reduction (in addition to the standard Dolby B), it banishes every audible trace of tape hiss, letting the music emerge against nearly total silence. Its three-head design lets you monitor your tapes while you're recording them, so you can correct any maladjustment instantly. The dual-capstan transport keeps tape tension constant as the supply reel unwinds inside the cassette, limiting wow and flutter to a minimal 0.021 percent.

Most importantly, the *Accubias* feature test-runs each tape to determine the optimum bias setting and then applies the correct bias automatically. This assures the best possible recording from whichever tape type you have chosen. The recording head itself is made of Sendust, an alloy that concentrates magnetic flux, thereby extending frequency response on high-bias tapes to 19,000 Hz. As an added convenience, a computer-controlled, real-time tape counter lets you know exactly how much recording time remains on your cassette.

Super speakers

But the real clinchers in our top system are the Ohm Walsh 2 speakers. Named after the late Lincoln Walsh, the physicist who first formulated this patented speaker concept, they are unique both in their outer shape and their sophisticated innards. Their inverted cone radiator maintains proper phase relationships throughout the audible range, while spreading sound in a full circle. In this model, rearward radiation is attenuated through a sound shield to prevent wall reflections from the immediate vicinity and resultant placement problems.

A conventional tweeter augments sound output in the uppermost range so as to restore whatever stereo directionality might otherwise be lost in the overall sound scatter. The net effect is a wonderful sense of total immersion in sound. Add to this the exquisite clarity of the treble and ample bass, free from false boominess, and you have a speaker that speaks the musical truth.

All in all, our "Penthouse" rig pretty much meets the ultimate audio test: It makes you unaware of its presence. You feel there's nothing between you and the music. PM

MAKE MONEY

Millions of tires have damaged or mis-matched whitewalls. They can earn you big profits with our equipment and you can start a business beautifying tires. You charge $5 per stripe per tire, which can mean $20 or more for a set of four tires. An average set of tires takes only 20 minutes. Some car dealers provide up to 10 cars per day to be serviced. Material cost is less than 10¢ per tire.

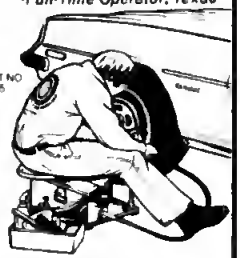
NO FRANCHISE FEES, ROYALTIES, OR OVERHEAD. TAX BENEFITS. NO EXPERIENCE NEEDED. We provide an expense paid trip (up to $300) to Dallas, Texas for full training and you can become an Authorized *Tire Customizing* Specialist in a very short time.

Part-Time **$175.00**
"This is what I made in only four hours!"
-Part-Time Operator, Arkansas

Full-Time **$1,000.00**
"This is what I made in one week, after only 20 weeks in business. It sure renewed my faith in the Free Enterprise System" *-Full-Time Operator, Texas*

- *Whitewalling*
- *Repair Curb Damage*
- *Color Stripes*
- *Lettering*

U.S. PATENT NO 3,563,105



Windshield Repair Kit Available

Ask for Operator 804 **GLOBAL MARKETING** **PM1082**
P.O. Box 202061, Dallas, Tx 75220

Call NOW Toll Free **1-800-824-7888** **1-800-852-7777**

Enclosed is $1.00 (for postage) Please rush me the complete information package

Name _____

Address _____

Phone No. _____
(No information sent without phone number)

City _____ *State* _____ *Zip* _____

WELCOME YOUR VISITORS WITH *MUSIC...*

This Amazing **Electronic Door-Tunes** is a modern marvel of today's computer technology. It's microcomputer memory will welcome your visitors with a choice of melodies to suit any occasion.

It's amazingly simple to use. Just set the switches hidden behind the front cover to select your choice from Door-Tunes **30 Melodies** or, if you wish, set it to **"AUTO"** and a **different tune will play** for each successive caller.

Door-Tunes is **easy to install.** Just connect to your existing doorbell wiring and it will run up to one year on two 9-volt batteries (not included). Or, you can use your existing bell transformer. Either way, simple to install instructions are included. Also has adjustable volume and tempo plus special tune to announce callers at your rear door.

BRING THE SOUND OF MUSIC TO YOUR DOOR

Please send ____ Door-Tunes at only **$29.95 ea.**

Name _____ (CA Res Add Tax)

Address _____ City ____ State, Zip _____

Please include $3.00ea. for shipping & Handling. Check, MO, VISA, Mastercard (includes card No. & expiration date.# _____

SRJ INTERNATIONAL CORP
1936 Hillman Avenue, Belmont, CA 94002

DRIVING THE '83 GM CARS

(Continued from page 100)

ground via Goodyear Eagle GTs, alloy wheels and as much roadholding hardware as the engineers can cram between the fenders. The interior receives the full treatment, with Recaro seats, a gauge package and unique trim touches. With all this muscle, the STE designation should probably stand for steroids, a badly needed original equipment additive which the A-car has finally gotten.

But while Pontiac is working hard to position itself as GM's "driving excitement" division, there's good news for enthusiasts at the other divisions, too. Buick's elegant Riviera convertible will be joined early next year by a pair of more youthful and much less expensive flip-lid front-wheel-drive J-cars: Chevrolet's Cavalier convertible and Pontiac's 2000 Sunbird.

Chevy's gutsy 135-hp HO (high-output), 2.8-liter V6 becomes available in any compact Citation as well as in many other GM cars. Olds offers a European-style ES sedan and ESC coupe versions of its compact Omega, plus a hot new Hurst/Olds Cutlass. Buick boasts no less than five different T-type performance models, and even stodgy old Cadillac touts a tastefully turned-out and fine-handling Eldorado Touring Coupe.

The nice, but formerly sluggish import-fighter J-cars (Cavalier, 2000, Firenza, Skyhawk and Cimarron), have livelier performance across the board thanks to new 2.0-liter pushrod, and 1.8-liter overhead-cam engines—both electronically fuel-injected—plus five-speed manuals and quicker responding automatic transaxles.

Beyond that are expanded availability of fun-driving, fuel-saving, five-speed manual transmissions in Chevy Chevettes and Camaros and Pontiac 1000s and Firebirds, as well as four-speed automatics in various other car lines.

And there are loads of other improvements and refinements throughout the extensive General Motors lineup, ranging from upgraded seats and interior trims to significant power train developments to new super stereo sound system options.

Chevrolet

Gearing up for economy is the game being played over at Chevy. Cavalier gets a five-speed transaxle with a 2.83 final drive and overdrive ratios in fourth and fifth. The Cavalier ME version's supertall 2.36 final drive hits the EPA charts at 30 mpg city and nearly 50 mpg highway. But the lazy gearing lessens the driving fun.

The hot-selling Camaro isn't much quicker with its new fifth-gear overdrive, but the new four-speed overdrive automatic on dual TBI V8 Z28s does bump 0-to-60 time to about 8.5 seconds.

The Celebrity A-car can now be ordered with the peppy, Olds-built 4.3-liter diesel, while over in Chevette land, five-speed and new styling is the big news.

Finally, the 4.4-liter V8 is replaced by the more powerful 5.0-liter V8 as optional in Monte Carlo and standard in the Caprice wagon.

Pontiac

Pontiac's answer to the European performance sedans is the 6000-based STE. The six-light front end, full-width blackout taillamps, subtle two-tone paint combinations and aerodynamic cast-aluminum wheels set it apart visually. The 135-hp HO V6, coupled to the standard three-speed automatic transaxle, gives it 11-second, 0-to-60 muscle, and fat Goodyear Eagle GT tires glue it to the pavement on twisty roads.

Inside is an electronic Driver Information Center that displays door/hood/deck ajar, exterior lamp and fluid level, including fuel status, plus oil pressure, voltage and even driver-programmable service intervals.

Firebird shares the Camaro's four- and five-speed gearboxes, with the dual TBI Trans Am getting the optional four-speed automatic. The S/E model now has the HO V6 as standard.

The fwd 2000 (formerly J2000) comes across with better motivation and economy with the new 1.8-liter OHC injected Four and standard five-speed box.

Face- and taillifts are the order for Phoenix and 1000. The former gets the HO V6 and handling goodies in the sporty SJ model, while the latter is available with a five-speed and also the Isuzu diesel Four.

Grand Prix and Bonneville get a new optional 5.0-liter V8 to replace the 4.1-liter V6.

Buick

Buick's T-Type series, ranging from the small fwd Skyhawk to the personal luxury fwd Riviera, all offer unique appearance, special features and improved performance and handling compared to ordinary models in the same car lines.

The fwd compact Skylark (X-car) gets an aerodynamic rear decklid with a built-in spoiler plus new optional electric remote control out-

side mirrors. The T-Type Skylark coupe comes with the HO V6 engine, and Gran Touring suspension. It's the fastest and best handling of the bunch.

Both rwd Regal coupe and fwd Riviera T-Types feature Buick's famous 3.8-liter turbocharged V6, which boasts 180 hp, improved electronic knock-sensing and other refinements for 1983. Both come with automatic transmission only.

Oldsmobile

Hurst/Olds 1983 features a 180-hp, 5.0-liter V8 engine, special heavy-duty handling suspension, tires and wheels, full instrumentation, graphics, front airdam, hood scoop and a rear deck spoiler. There's a weird three-stick Hurst Lightning Rod shifter controlling the four-speed automatic transmission.

The fwd compact Omega X-car comes in Euro-look ES (sedan) and ESC (coupe) versions. Both have handling suspensions and are available with the HO V6 engine. The ESC features exclusive damage-resistant, soft plastic front fenders.

Cadillac

GM's luxury-car division is first to can the carburetor with across-the-board fuel injection for '83. This starts with J-car Cimarron's new EFI 2.0-liter engine and extends through the other models.

Cimarron also gets the much needed five-speed transaxle as standard (the automatic remains optional), plus an appearance upgrade to pull it away from the other J-car sedans. Cadillac offers its special Touring Suspension as an option on any fwd Eldorado or Seville and all the big Cadillacs need is more power than the standard 4.1-liter V8 can possibly provide. A new feature is the Delco/Bose optional sound system (available in Eldorado and Seville, plus Olds Toronado, Buick Riviera and the coming all-new '83 Corvette). Each speaker enclosure—two in the lower front doors and two on the rear package shelf—includes its own amplifier, a dynamic noise reduction (DNR) control, a tape equalization switch and Dolby noise reduction. It'll be a $700 to $800 option, and you have to hear it to believe it!

There it is: a carryover year allowing extensive power train and feature refinements while the world's largest automaker takes a welcome breather from its long series of major new-model introductions. But it all starts again soon—maybe too soon—when the super-exciting new Corvette makes its bow next spring. PM

NEVER BEFORE AVAILABLE TO HOMEOWNERS

TEFLON* STRENGTH MULTI-PURPOSE LUBRICANT

MAGNALUBE®-G

The Grease with Gumption!

USED AND RECOMMENDED BY MAJOR MANUFACTURING COMPANIES.

One application of Magnalube*-G does the same job as six applications of conventional grease. The TEFLON* particles in this multi-purpose lubricant deposit a protective coating on metal surfaces that remain even if the grease is wiped away, holds up under extreme pressure and is waterproof.

IDEAL FOR AUTOMOBILES • BICYCLES • APPLIANCES • HARDWARE • POWER TOOLS • MOWERS • BEARINGS • FISHING AND MARINE EQUIPMENT • GUNS AND MANY MORE HOUSEHOLD USES.

MAIL-IN SPECIAL

Order a 14¼ oz. cartridge of Magnalube*-G fits all standard grease guns. Order now and receive

FREE a 1.5 oz. tube of Magnalube*-G

A total value of $7.50 for only $5.50

FILL IN COUPON AND MAIL WITH CHECK OR MONEY ORDER TODAY!

Reg. U.S. Pat. office for Dupont's fluorocarbon resins. Magnalube-G is a registered trademark of Carleton-Stuart Corp.

SATISFACTION GUARANTEED OR YOUR MONEY BACK

Send to: Carleton-Stuart Corp., 13-02 44th Ave., Long Island City, New York 11101

Please send me ___ Magnalube*-G cartridges at $5.50 each plus $2.75 postage and handling

Please allow 4-6 weeks for delivery

Name _____

Address _____

City _____ State _____ Zip _____

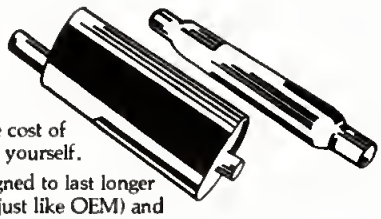
(N.Y. State residents add sales tax) F.H.

A MUFFLER IS A MUFFLER, UNTIL YOU TRY TRIMLINE® AND BIG DADDY®

We know you are a mechanical whiz and that you spend hours working on your car. We also know that a good quality muffler is vital to your car's working order.

But there are some very important things we want you to know.

Did you know that:



- More than 30% of mufflers sold are being installed by do-it-yourselfers like you.
- You can save at least 50% of the cost of a quality exhaust job by doing it yourself.
- Our Trimline® Muffler was designed to last longer (aluminized steel), install easier (just like OEM) and lets your car perform like new. Everything you need is in the carton.
- Our Big Daddy® Glass Pack Muffler is the top do-it-yourself, performance muffler available.

We're part of the world's largest retail exhaust installation group. And a muffler is just a muffler unless it's made by us. Trimline and Big Daddy. At low prices at fine retail locations everywhere.

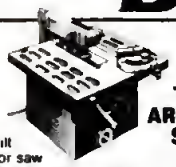
Write or call us today for the store nearest you.

TRIMLINE/Big Daddy

4101 W. 42nd Place, Chicago, Illinois 60632 (312) 254-4500 (Ext. 325)

AMERICA'S 7 BEST POWER TOOL BUYS

1 8" TILT ARBOR SAW



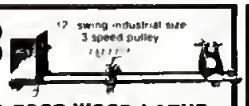
8" tilt arbor saw crosscuts, rips, mitres, cuts compound angles, dadoes, coves moldings. Less blade, motor. Rip fence for easy alignment $6.50 add'l. Ball bearing model $12.50 add'l. Takes 1/3 h.p. motor or larger standard blades, attachments. 22 lbs. f.o.b. factory **$52.50**

2 BELT SANDER

Changes from horizontal to vertical in seconds

Precision heavy duty sander includes a 4" x 36" sanding belt. Uses 1/3 h.p. or larger motor. V-pulley drive end, multi-purpose drive spindle. Disc sander accessory $17.00 add'l. Mitre gauge $3.50 add'l. 18 lbs. f.o.b. factory **$52.00**

3 4 FOOT WOOD LATHE



Does the job of $150 unit. Tubular steel bed rails, screw action tail stock. Use any size motor 4" face plate. $4.50. 30 lbs. f.o.b. factory **$67.75**

DELUXE HEAVY DUTY LATHE
Double shielded, lubricated for life ball bearings. 30 lbs. f.o.b. factory **$79.50**

4 LONG BED WOOD LATHE

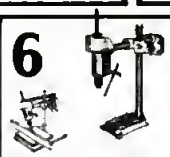
55" version of the deluxe heavy duty lathe, has ball bearing live center in tail stock and extra heavy bed tubes. 40 lbs. f.o.b. factory **$94.00**

HIGH SPEED TURNING CHISELS { Set of 3 $11.00 / Set of 8 $29.00

5 JOINTER-PLANER

4" x 22". Cast iron end steel precision ground adjustable tables. For planing joints, bevels. Cuts to 1/8" depth. Fence adjusts from 0° to 50°. Steel knives and dual guards. Use any motor. Precision ball bearing industrial model. $15.70 add'l. 19 lbs. f.o.b. factory **$63.30**

6 32" RADIAL DRILL PRESS



Precision 32" radial unit has standard features and many extras. Depth of throat up to 16". Head tilts and table stays level. Drills to center of a 32" circle. Cast iron end steel. Less motor, belt and pulley. 30 lbs. f.o.b. factory **$89.90**

7 WOOD SHAPER KIT

Makes beads, coves, moldings, tongue-and-groove joints. Accurate at high speeds. Sealed and greased for life ball bearings. Less wood. Takes ¼ h.p. motor or larger. Standard cutters. Optl. hold down assem. $4.50 add'l. 6 lbs. f.o.b. factory **$39.90**

These power tools have no chrome, embossed nameplates or any other useless extras — but they do the same job as tools costing 2 to 3 times the price! And their performance has been proven in the shops of literally millions of professionals and serious amateurs.

Don't be misled by AMT's low prices: these are quality tools. They are full scale, full speed and offer top performance and precision. There are good reasons why we are able to offer such values. Here is how we do it:

Engineered for simplicity: After years of engineering refinements, virtually all the frills have been eliminated in order to save you money. **Faster machining:** Specially designed automatic machining equipment cuts costs by cutting production time. **Standard parts:** Ordinary hardware items replace custom parts for enormous savings.

Volume: Our own foundry, our huge mass production facilities and our large buying power—all keep costs down. **Direct factory purchase:** You pocket the savings but we still offer our two terrific guarantees!

POWER SAW: Our tilt arbor saw comes completely assembled with ground cast iron table, safety guard, splitter and mitre guage.

In addition you get a free set of cabinet base plans that show you how, with one sheet of 3/4" plywood, you can convert this saw into a floor model with a big 27" x 24" top. Cabinet rip fence only $7.50 additional. And you can use your new saw to cut out the cabinet base!

BRAND NEW ELECTRIC MOTOR
Develops a full 1 h.p. 17 lbs. f.o.b. factory (purchased separately $54.05) $49.00

AMT OFFERS TWO GUARANTEES:

OUR 10-DAY MONEY BACK GUARANTEE
Try any of these power tools and compare it with any similar machine at any price. If not satisfied return it for prompt no questions asked refund! We pay the return shipping charges.

10-YEAR FULL SERVICE GUARANTEE
Any part or parts of these AMT power tools (except motor which carries a one year gaurantee) which becomes inoperative for any reason within 10 years after purchase date will be repaired or replaced by the factory with no charge to the purchaser other than postage.

AMERICAN MACHINE & TOOL CO., 4TH AND SPRING STS., ROYERSFORD, PENNSYLVANIA 19468

BUY DIRECT . . . USE THIS HANDY ORDER COUPON TODAY

AMT

American Machine & Tool Co., Dept. PM02, Fourth & Spring Sts., Royersford, Pa. 19468
Please send me the units checked. Payment in full enclosed $_____ or $5 deposit each item enclosed, balance C.O.D. or charge my ☐ ☐ VISA

1 ☐ 8" tilt arbor saw, $52.50
☐ Standard rip fence, $6.50
☐ Long cabinet rip fence, $7.50
☐ Ball bearing spindle, $12.50

2 ☐ Belt sander, $52.00
☐ Disc sander attachment $17.00
☐ Mitre gauge for sander, $3.50

3 ☐ 12" swing, 4' lathe, $67.75
☐ Deluxe ball bearing lathe $79.50
☐ Face plate, $4.50

4 ☐ Long bed wood lathe, $94.00
☐ Face plate, $4.50

Turning chisels for any lathe
☐ Set of 3, $11.00
☐ Set of 8, $29.00

5 ☐ Jointer-planer, $63.30
☐ Ball bearing spindle, $15.70

6 ☐ 32" radial drill press with tilting head, $89.90

7 ☐ Wood shaper kit, $39.90
☐ Optional hold down kit, $4.50

Generat Electric Motors
☐ $49.00 (with other item)
☐ $54.05 (purchased separately)

Visit our Royersford factory showroom for these same low prices. 4th and Spring Sts. From 9 to 4:30 on weekdays and 9 to 12 on Sat.

Card No._____ Expiration Date_____ Signature _____
Name_____ Address _____
City_____ State_____ Zip_____

NEW Self-Cleaning Catalytic Filter

- increases woodstove efficiency up to 30%
- inhibits creosote build-up
- prevents chimney fires
- reduces woodstove pollution
- monitors stove's efficiency with high-accuracy magnetic temperature gauge

Designed to fit the Original SMOKE CONSUMER and SMOKE CONSUMER JR Kit. And all other continuous burn reactors.

Today - send $1.00 (postage and handling) for information & literature.

LINCOLN WORKS, INC.
194 MILLERS FALLS RD., TURNERS FALLS, MA 01376
TEL 413-863-9080 DEPT. PM

GET THE MOST OUT OF YOUR CAR.

SAVE $8.32 ON THE TOTAL CAR CARE SYSTEM.

- TIRE SEALANT-Seals punctures instantly.
- CARB DEGUNK-The finest carburetor cleaner.
- RADI-AID-Prevents overheating and rusting.
- MILES PLUS or DEEZL PLUS-Cleans and tunes engines.

Regularly $30.28. NOW $21.97 complete. Plus $2.75 postage & handling.

FREE GIFT! CLEAR Glass Defogger. $2.00 value.

ORDER TOLL FREE
1-800-824-7888
In Cal. call 1-800-852-7777.
Ask for Operator #828
MC or VISA accepted

For free car info, write:
1060 Rogers Ave.
Brooklyn, NY 11226

OTO™ MOTIVE

The Kit Option.

Our finished speakers are recommended by Hi-Fi reviewers everywhere but some people want the savings and satisfaction that comes with building and finishing their own. Hence our kit option. Write us for our free catalog.

speakerlab
Dept. CPM210 735 N. Northlake Way
Seattle, Washington 98103

HOW TO FIND GOLD NUGGETS ELECTRONICALLY

Finding gold nuggets or coins is now made easy with e new patented gold finding detector. Before with other detectore it was virtually impossible becauee of interferance from bleck eend. This new detector is uneffected by black eand and cen detect pinhead size gold nuggete et great range. Its maximum range is 17 feet. It ia very lightweight and hes perfect balence. One of our cuetomers who had tried five other makes and couldn't find e single nugget now reporte finding up to six nuggets in one hour with hia Gardiner detector. Recently e 400 ounce gold nugget was found with e detector. Free catalog.

GARDINER ELECTRONICS
Depf 31 • 4729 N 7th Ave • Phoenix, AZ 85013

NO INVESTMENT! INSTANT INCOME!

Run your own profitable "shoe store" business from home in spare or full time. We give you — FREE — complete Starting Kit that makes you $217.00 EXTRA each month for just 2 easy orders a day. You feature 350 fast-selling dress, sport, work shoe styles for men and women. Air-cushioned insoles, and 75 years of shoemaking craftsmanship! Sizes 4-16 — widths AA-EEEE. Draw on 500,000 pair stock. Earn prizes, bonuses, shoes for yourself. Rush postcard for your FREE Starting Kit today . . . Now!

MASON SHOE MFG. CO.,
Dept. H-996
Chippewa Falls, WI 54729

A Flexible Early American Design
"CARRIAGE SHED"
4 Depths At Side 20, 21-4, 22-6, & 24
1,2,3, Or More Car Spaces
3 Door Types, Shop At Side, Etc
2nd Floor Studio, Playroom, Storage, Etc

Complete Construction Details For The 4 Depths And 4 Optional Front Arrangements

PLANS $10.00

ELI TOWNSEND & SON
PO BOX 6-M, SAUGATUCK STA.
WESTPORT, CT. 06880

Plans Are Reproducible And By Req'd Prof'l Eng'r (Post Paid)

PUMPS $19.95 1¼" IN 1" OUT

Quality Since 1950

1/2" Shaft

MONEY BACK GUARANTEE

Heavy, Duty, High Capacity FACTORY TO YOU! Ideal for draining laundry tubs, cellars, cesspools, swimming pools, to irrigate, fill tanks, boost pressure and circulate, etc.
Oil-less bronze bearings, self-adjusting automatic seals. Bodies made of heavy HIGH IMPACT PLASTIC made in our factory using special alloys to resist acids found in laundry water and swimming pools. Open type impellers permit the handling of semi-solids. Pumps designed for clockwise rotation facing pump shaft. Will work with gas or electric motors. Suction and discharge outlets are threaded for standard pipe sizes. 3,000 GPH with 1/4 HP 1750 RPM Motor. Use belt or direct drive. For more capacity and pressure, add H.P. & R.P.M.
SEND $19.95 plus $3.00 for Shipping & Handling to HIGH POINT MFG. CO., Erial, New Jersey 08081

DRAFTING FOR BEGINNERS

Learn at Home in Spare Time No special talent or previous experience needed. New short course covers the basics you need to prepare for an entry-level job. Experts explain everything in language easy for beginners to follow. Special tools and materials included to give you actual practice—drawing instruments, straightedge, scales, protractor and plenty more. You can ask questions 24 hours a day. Use our home-study telephone hot-line as soon as you enroll—we pay the bill! **Write today for FREE FACTS! No obligation. No salesman will call**

ICS SINCE 1891 **School of Drafting**, Dept PB092
Scranton, PA 18515

SURPLUS CENTER Can Help You Save Energy, Save $$$$$$

Powerful Hydraulic Log Splitter Portable

FEATURES
- 10-1/2 tons splitting force
- Fast splitting cycle (10-sec)
- Splits logs up to 26" long
- 5 HP BRIGGS gas engine
- Powerful 2-stage hyd pump
- Detent control valve returns to neutral automatically

$789.50 F O B Lincoln

• (ITEM #1965) - - Split wood for your own use for profit earn extra money on rentals. Built from finest quality components

ENERGY BOOSTING
Centrifugal Blower

F O B Lincoln **$10.95**

• (ITEM #16-944) - Boost efficiency of wood stoves heaters. Use for ventilating exhausting etc. Discharge 2-1/2" square 115 VAC, 100-CFM 8" x 7" x 7" (6 lbs)

Vehicle Battery Motor

1/2 HP, 12 to 36-VDC REVERSIBLE

$34.95 F O B Lincoln

• (ITEM #1066) - Use to motorize bikes scooters etc. 2400-RPM at 24-VDC 3600-RPM at 36 VDC. Ball bearings 3/4" diam shaft 6" diam x 9" (13 lbs)

For 100-Page Equipment Catalog Send 80¢

- LOWEST PRICES ON
- GEAR MOTORS
- BUILDERS
- SPEED REDUCERS
- FIRE/BURGLAR ALARMS
- POWER TOOLS
- ELECTRONICS
- ENGINES
- HYDRAULICS
- SURVEYING INSTS
- HOSE
- COMPRESSORS
- POWER PLANTS
- WINCHES
- PUMPS
- TELEPHONES
- MANY MORE

VISA

(You Can Order Direct From This Ad)
OUR TELEPHONE (402) 474 4366

Log Splitter Components
(FOR "BUILD-IT-YOURSELF" MECHANICS)

2-STAGE PUMP
(ITEM #9-1130)
Reg. $199.50
SPCL **$120.00**

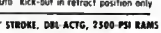
• 10-GPM at 500 PSI, 2.25-GPM at 2250 PSI. Shaft diam 1/2", ports 1/2" NPT 8" x 5" x 4" (9 lbs) F O B Lincoln

#9-1063 AUTOMATIC CONTROL VALVE

#9-1062 or #9-073
Reg. $64.50
(12 lbs) SPCL **$59.95**

• 4-way 3-position detent with auto kick-out to neut. 30-GPM in/out ports 3/4" NPT work ports 1/2" NPT 12" x 5" x 4"
• (ITEM #9-075) - - Same, except detent and auto kick-out in retract position only

24" STROKE, DBL ACTG, 2500-PSI RAMS



• (ITEM #9-062-24) - - 3-1/2" bore 1/2" NPT ports rod 1-1/2" d (45 lbs) Prices F O B Lincoln Reg. $129.95 SPCL **$110.00**
• (ITEM #9-030-24) - - 4" bore 1/2" NPT ports rod 2" d (62 lbs) . . Reg. $179.95 SPCL **$149.50**

SPECIAL PRICES ON SPLITTER COMPONENTS EXPIRE NOV. 30, 1982

The Wind Is FREE
CONVERT IT TO ELECTRICAL ENERGY

WINCHARGER — 12 OR 24 VOLT WIND ELECTRIC BATTERY CHARGER
STARTS CHARGING IN ONLY 7-MPH BREEZE
BRAND NEW

STANDARD EQUIPMENT INCLUDES
- INSULATED INSTRUMENT PANEL
- PROPELLER
- GENERATOR
- ENCLOSED COLLECTOR RING
- AIR BRAKE GOVERNOR
- 10 FOOT WINCHARGER TOWER

IDEAL SOURCE OF ELECTRICAL POWER FOR REMOTE LOCATIONS
EXCELLENT SOURCE OF POWER FOR LIGHTS, ETC. IN AREAS OF FREQUENT BROWN-OUTS

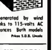
EASY TO INSTALL ON FLAT OR SLANT ROOFS

Prices F O B Lincoln

(ITEM #6-915) 12 VDC, 200-Watts, 14-Amps. **$519.50** (130 lbs.)	(ITEM #6-925) 24 VDC 200 Watts 7 Amps **$519.50** (130 lbs.)
(ITEM #6-922) 12 VDC, 450 Watts, 30-Amps **$795.00** (160 lbs.)	(ITEM #6-926) 24-VDC 450 Watts, 15 Amps **$795.00** (160 lbs.)

• Wind driven generators keep (12-volt or 24-volt) battery system charged to provide power for lights DC radios, etc. Charging starts with only 7 MPH breeze. 23 MPH gives max charging 200 and 400-watt units for 12 and 24-volts. Use with inverters (below) to change DC to 115-VAC for lights radios TV tools etc. Instructions furnished

INVERTERS Convert DC To AC



(ITEM #6-923) 15 VDC to 115-VAC 500-Watts, 5 Amps **$388.00**

(ITEM #6-924) 24-VDC to 115-VAC 1260 Watts 10 Amps **$388.00**

BRAND NEW

• Convert DC power generated by wind generators and battery banks to 115-volts AC power for lights and appliances. Both models 14" x 9" x 8" (52 lbs) Prices F.O.B. Lincoln

SURPLUS CENTER PM-102 LINCOLN, NE 68501

APPROVED FOR VETERANS

Learn how to MAKE MONEY in DRAFTING

Train at home in spare time. No previous experience needed. Tools and materials included with course. No special talent required. We show you what to do, how to do it. **LEARN DRAFTING AT HOME!**

CAREERS IN DRAFTING — APTITUDE TEST — FREE! "CAREER KIT"

NAME ______ AGE ____
ADDRESS ______
CITY ______ STATE ______ ZIP ______

Accredited National Home Study Council
NORTH AMERICAN SCHOOL OF DRAFTING,
4400 Campus Dr. Dept PB092, Newport Beach, CA 92660

FROG STICKERS

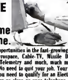
(half size)

This Heppy Green Frog, printed with your neme end address or slogen, adds e little fun to letters, books, luggege, perties, campaigne....

Frog Shape...Self-Stick
100 for $6.70 200 for $9.50 ppd

FROGS, Box 735-F, Acton, Mass. 01720

Be an ELECTRONICS TECHNICIAN! Get your 2-Year ASSOCIATE DEGREE Train at home in spare time.



Choose from exciting opportunities in the fast-growing space-age industries... Automation, Aerospace, Cable-TV, Missile Design, Electronic Circuitry, Computers, Telemetry and much, much more. No previous experience necessary. No need to quit your job. Your Associate Degree gives you everything you need to qualify for an Electronics Technician Position. Instructors are as close as your telephone. Use our 24-hour home-study hot line—we pay the bill. Send for free facts. No obligation. No salesman will call. **Mail coupon today!**

ICS SINCE 1891 **Center for Degree Studies**, Dept PB092
ICS Electronics Center, Scranton, PA 18515

Rush free facts telling how I can train to be an Electronics Technician and get my 2-year Associate Degree at home in spare time.

NAME ______ AGE ____
ADDRESS ______
CITY/STATE/ZIP ______

ONE-MAN Sawmill

The Only ONE-MAN PORTABLE SAWMILL Of Its Kind In The World!

If you need good, high-quality lumber, don't let inflated lumber prices stop your important building projects. The Belsaw goes right to the trees and turns out smooth, true-cut lumber . . . even beginners get excellent results. Just one man (no crew needed) can easily cut enough on weekends to save hundreds of dollars over high lumberyard prices. For power use tractor PTO or other low HP diesel or electric unit. Factory-direct selling keeps price low, and convenient time payments may be arranged.

Send for FREE BOOK! Just mail coupon below for *"How To Saw Lumber"* booklet and complete facts on the One-Man Sawmill. There Is NO Obligation and NO Salesmen Will Call on you. Do It TODAY!

BELSAW MACHINERY CO.
3003 OFIELD BUILDING
KANSAS CITY, MO 64111

Please send all facts and details in your FREE BOOK "How To Saw Lumber". I understand there is No Obligation and that No Salesman will call on me.

Name ______
Address ______
City-State ______ Zip ______

SOTZ HEATER MOST EFFICIENT

TEST RESULTS OF CONSUMER'S UNION

"THE HIGHEST EFFICIENCY of any of the stoves-better than 65 percent-and it worked well with small loads of wood. The stove's flue-gas temp. tended to stay moderately low, even with the air inlet fully open. (The inlet opening is small, apparently for safety reasons, since this huge stove could otherwise be dangerously overfired.) When closed, the inlet choked the fire effectively. The stove's wood capacity is enormous. The parts in the kit are of high quality". Consumer Report Oct. '81.

PRICE:

	DELIVERED TO YOUR DOOR	FACTORY PICK UP
30-Gal. - Bottom	$32.95	$28.95
55-Gal. - Bottom	$38.97	$34.96
Top Kit fits both	$20.97	$17.96

(Drums Not Supplied)

* Guarantee: Our famous 1-year trial offer, 10 years against failure, plus, we have been in business 26 years to back it up.

VISA AND MASTERCARD RUSH ORDERS
CALL 1-800-321-9892
(INSIDE OHIO CALL 1-216-236-5021)
or SEND CHECK OR MONEY ORDER....
Sorry, no C.O.D.'s

55 KIT SHOWN

* LIFETIME TAPERED PRECISION FORMED DOOR AND FRAME SEAL. NO DUSTY ASBESTOS GASKET TO REPLACE
* ALL MODELS SAFETY TESTED TO UNDERWRITERS LAB. SPEC., BY GEISSER ENGRS.

$34.96 55-GAL bottom kit factory pick-up

$28.95 30-Gal. bottom kit factory pick-up

* PATENTED INTERNAL DRAFT CHANNEL... Air entering top draft control is preheated as it is drawn down inside of door, and is sucked into bottom of heater with a turbulent action, mixing with the wood gases. This makes the Sotz stove most efficient. Also, it's impossible for hot sparks to jump out of heater os in others with draft straight open to fire.
* Top drum kit squeezes 60% more BTU'S from heat normally lost up the chimney.
* Engineered to limit metal temp. of barrel to prevent burn up.
* Heavy all steel kit won't crack as poorly made cast iron imports with undersized door openings.
* 55 Gal. kit has a king-size 15½" diagonal opening for easy loading, less splitting of wood.
* 30 Gal Sotz has bigger opening (9¼" Rnd.) than other brands' 55 gal. kits.

FREE info about heating water, drying wood, fireplace-to-woodstove.

Sotz Corporation, 13643 Station Rd., Columbia Station, OH 44028

LEAKY, UNCONTROLLABLE

Send me one of your barrel stove kits. I've seen your ads for years in the Mother Earth News, but was under the impression your kit was like one my father has used for years: leaky, uncontrollable, etc. In my work as a chimney sweep, I met Peter King of Gonsvoort, N.Y. He was very impressed with your stove kit, and after cleaning his chimney this past season, I'm impressed too! I know how long his stove holds a fire - because after being unattended for 2 days, it's been too hot to handle and the creosote deposits were consistent with most well managed airtights. Congratulations!

Jeff Payne, Fort Edward, N.Y.

ON THE LEVEL! Called B.B.B.

Several months ago my husband asked me to order him the Maul. ...I still didn't trust sending my money to Ohio and receiving an inferior product in return. I called your B.B. office to check you out before I ordered. You are on the level. My husband and son appreciate the good workmanship of the maul and it really works as you say. Very very well. We also ordered the top drum kit. Keep up the good work we are telling our friends about your products.

C. Simon, Birmingham, Al.

NO OVERSEAS JUNK

I would like to commend you on your heater kit. With Illinois winters being what they are I expected to cut at least seven or eight cords of wood. But your fifty-five gal. unit gives so much heat for so little wood used and keeps hot coals longer than I expected. It is going to take a lot less wood than I figured. . . This bottom heating unit does a fine job heating up our four rooms. I am glad there is a company that's making a heater kit that is affordable. What this country needs is more quality items at decent prices, instead of expensive junk from overseas. Thanks for a great product.

Vernon Dace, Rushville, Il.

A HOT DESIGN

I purchased a stove kit last year and installed it on a Rudd 50 gal. commercial copper-lined gas water heater. The stove required only a small amount of fuel to hold a good charcoal fire. I wish also to congratulate your engineers on the excellent door design. The door is actually air tight and does not warp with high heat. Please enter my order for a standard stove kit for a 55 gal. drum. P.S. I am a retired design engineer.

Paul Fontaine, East Moline, Ill.

DOUBTING THOMAS

Two winters ago, I purchased your drum kit. . . We are heating a 24' x 31' basement, and 26' x 31' ranch home with cathedral ceiling. Last winter, we burned about 3 cords of wood which kept our home at 75-80°. We would not part with this set up for any other stove or furnace in the world. Whenever we have anyone come into our home they are amazed at how warm our house is especially when they see how we heat it. We have gone away for 3 days after filling stove and found hot ashes when we returned and house is still warm. I also like the idea that I can cut wood 24" to 30" long. So pleased with this barrel stove we got our son-in-law who was a doubting Thomas to put one in his home. He was soon so convinced and sold on it that I helped him put another barrel in, so he has the 2 barrel set up for his 7 room house.

L. Sierpinski, Alstead, N.H.

NO BARREL OF PICKLES

I have a three year old double barrel stove and couldn't be more pleased. It's just as good as the day I built it. There was an Earth Stove in our house when we moved here and my barrels out perform it 100%. As far as I'm concerned there isn't a more practical, useful, or easier-to-operate stove in the world. If more American manufacturers delivered on their claims for their products the way Sotz does, our country wouldn't be in the pickle it's in now.

L.E. Peterson, Connersville, Ind.

HEATS 2,220 SQ. FT.

Received lower barrel stove kit 55-H...and was very pleased with the results of this heater's operation. It was placed in service...and it heated two floors 2,220 sq. ft. to about 75° with outside temp. of 20°. I am now ordering the top kit DD, Lift-n-Saw TL, and the Monster Maul. For once I ordered something by mail that was better than advertised.

Edward F. Dostert, Augres, Mi.

Send for a free copy of the "Famous Sotz News" with many more letters plus money and energy saving ideas.

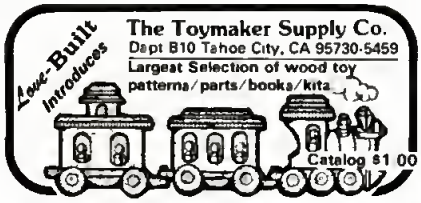
AMAZING SCIENTIFIC and ELECTRONIC DEVICES

PHASER shockwave and invisible FORCE FIELD generators. LASERS for weapons, cutting, burning, cloud writing, holography and special affects. NUCLEAR particle accelerators and detectors. PLASMA, ION, HIGH VOLTAGE, HIGH FREQUENCY TESLA COILS and LIGHTNING generators. TRANSMITTERS and CONTROL devices for security, telephones, intrusion detection, nature listening. PLUS PLUS INFRASONICS, ULTRASONICS, ENERGY, CHEMICAL and PERSONAL PROTECTION and SAFETY DEVICES. SEND $1 for catalog of plans, kits and completed items to:

INFORMATION UNLIMITED, INC.
P.O. Box 716, Dept. M8
Amherst, N. H. 03031

Lone-Built Introduces

The Toymaker Supply Co.
Dept B10 Tahoe City, CA 95730-5459
Largest Selection of wood toy patterns/parts/books/kits



Catalog $1.00

Men! Women!
GET YOUR COLLEGE DEGREE

Marketing, finance, public relations, personnel, much more.
College degree awarded with major in business management. Approved for G.I.'s and Veterans. Write for free details. No obligation. No salesman will call.

ICS SINCE 1891
AT HOME IN SPARE TIME
Center for Degree Studies, Dept PB092
Business Management Center, Scranton, PA 18515

FREE
THE GREAT ELECTRONIC THINGS & IDEAS BOOK!
HUNDREDS OF UNUSUAL PARTS, GADGETS & IDEA ITEMS UNAVAILABLE IN STORES OR CATALOGS ANYWHERE! Bargain prices on everything! New items in every issue! Rush postcard for your copy!

ETCO ELECTRONICS
Dept. 323
Plattsburgh, N.Y. 12901

NOW
BRASS BAR RAILS
For Your Home
and other solid brass bar accessories

Now you can have solid brass bar rails, standoffs, end caps, flanges, etc. for your home bar. The same quality as you see in the finest restaurants and pubs.
For Catalog send $1.00 to:
MIDWEST CUSTOM BRASS
208 E. Main Street, Dept. PM102 Round Lake Park, IL 60073

GENUINE HANDMADE BOOTS
Bootmakers for over 20 years. Top quality leather-many styles-reasonable prices. WRITE FOR FREE CATALOG.
Austin-Hall Boot Co.
P.O. BOX 12368-PM B Paso, Tx., 79912

RUN VEHICLES ON PROPANE!
Convert your car or truck to run on Gasoline or Propane! DUAL SYSTEM uses simple, locally obtainable tools & components with no engine modifications necessary! Forget Fuel Shortages! Extend Engine Life! SAVINGS in fuel costs pay for Conversion. COMPLETE PLANS including instructions, drawings, source lists, helpful suggestions and MUCH MORE. Only $8.95

GLENVALE PRODUCTS, Dept CH,
Box 358 Station D,
Toronto, ONT M6P 3J9

BUILD YOUR OWN **JET HELICOPTER**
EASY TO FLY—INEXPENSIVE TO BUILD!
- Carries one person-plus
- Uses low-cost fuel
- Simple hand-tool construction

Plans—completely illustrated $9.00

THE HELICOPTER HOBBYBOOK
Includes Plans for building a Piston-Engine-Powered Helicopter (fully illustrated) $7.00

BOTH ABOVE BOOKS only $14.00
HELICRAFT, Inc.
P.O. Box 16488 Baltimore, MD 21217

Men-Women! Make Money In Your Own Home Business!

"I STARTED WITH $100 AND MADE MILLIONS IN MAIL ORDER"

FREE MAIL ORDER COURSE

You can make a Mail Order Fortune much easier today. I want to help you but: If you are looking for a get-rich-quick-scheme... please turn the page. I did not get rich overnight. But I can tell you that within a short time in mail order I was making more money than any of my friends. The millions came later... and I owe every penny of it to mail order! If you are ambitious and willing to follow directions... I will help you get started on your way to mail order success!

G. L. MELLINGER,
Famous World Trader, Internationally known Mail Order Expert.
I started in Mail Order a few years ago, part time in my garage. I had less than $100. I discovered how to make Mail Order pay big. Today my business empire spans the globe... 1,253 acres of land, office buildings, warehouses. My Plan lets you use my experience to make a fast start in your own big profit home business.

YOUR HOME MAIL ORDER BUSINESS
Just a few hours a week part time at the start! Then branch out into full time! Keep present income while adding welcome "second income." Use Mail Order profits for travel, savings, education, retirement. It's up to you.

I learned long ago the success secret in Mail Order is picking the right product. I reveal in my Free Course 3 tests your product must pass to be a Mail Order winner! I'll show how to make up simple little ads that bring in orders and cash. Everything I tell you is based on my own success. I know it works.

BUY BELOW WHOLESALE FOR BIGGEST PROFITS
Imports are great for Mail Order. I travel the world searching out new imports you can turn into quick profits. Start with 24,221 best selling imports. Deal in one or many. Buy Below Wholesale direct from overseas supplier. You keep all the profit. I will also reveal my Drop Ship Plan that starts you with little or no product investment. Buy one at a time or in quantity.

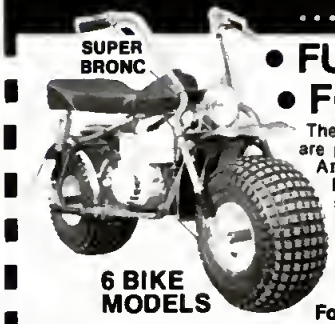
1000's NEW PRODUCTS EVERY YEAR
With my Plan you get free Membership in International Traders. Vast world wide organization keeps you supplied with new products every month to sell by mail or other ways. Members also attend my personal seminars held in cities near you. Mail coupon for Course and home business report. No charge or obligation. No salesman will call! Find out what Mail Order holds for you!

ACTUAL REPORTS OF MAIL ORDER MONEY MAKING!! CUTS OUT GREEDY MIDDLEMEN "Can make 80% more profit importing merchandise. The Mellinger Plan gave me new home, new car, own store." Bill Thiessen, Canada. 1T MEMBER STRIKES IT RICH "Followed your advice and got a free ad. 4,000 mail orders came in. I made $12,000 this first try, without investment in stock." L.M., Pennsylvania

INTERNATIONAL TRADERS

FREE MAIL ORDER COURSE COUPON
The MELLINGER Co., Dept. R225A
6100 Variel Avenue, Woodland Hills, CA 91367
Send Free Mail Order Course... Show me how I can start a Mail Order/World Trade Business of my own. There is no obligation; no salesman will call.
Name _____
Address _____
City _____ State _____ Zip _____
•Save 3 days, give ZIP for fast reply•

THE FUN MACHINES
... that work, too!



SUPER BRONC
6 BIKE MODELS

- **FUN TO BUILD!**
- **FUN TO RIDE!**

These rugged off road vehicles are powered by 5 hp to 16 hp American-made engines. Engine is completely assembled, frame is welded and painted. You just bolt everything together and start riding. Kit priced from $479.95 to $1279.95.

7 TRYKE MODELS
SUPER TRYKE

For a FREE color brochure with complete details, write or call:
Carl Heald, Inc. Dept. NMG, P.O. Box 1148, Benton Harbor, MI 49022
Call TOLL FREE 1-800-253-1030; In Michigan call 616/849-3400.

TURBOCHARGERS

SAVE UP TO 50%
ONLY $389.95

Turbo City has the components needed to Turbocharge your car or truck, including: Vans, Mini Trucks, Tow Vehicles and Class A Motorhomes. All at unbelievable prices.

Turbo City carries in stock one of the nation's largest inventories of brand new RAJAY Turbos for all engines from 40 to 500 C.I.D. Plus, Turbo City offers expert technical assistance to insure that you are ordering exactly the components that are right for your particular application.

REPLACEMENT PARTS:
We also maintain a huge inventory of related turbocharger components, accessories and parts.

ATTENTION BOAT OWNERS!
Order complete kits from Turbo City for all popular engine combinations.

ORDER DIRECT FROM OUR WAREHOUSE AND SAVE. FOR COMPLETE INFORMATION, SEND $2.00 ALONG WITH ENGINE MODEL AND APPLICATION

TURBOCHARGED TURBO CITY
Turbochargers & Accessories
1123 W. Collins, Orange, Calif. 92667
(714) 639-4933

CARVE RUSTIC SIGNS
In seconds with Guide-All II
3D Carving System $95.00 (20 x32 model) Also 3 larger sizes. Router not included. Fast sale, rugged accurate carving system for your router. Incised letters, raised letters, cut out letters, trademarks, murals, etc.
Send for free brochure & price list
THE RUSTIC SHOP
7431 Artesia Bl., Buena Park, CA 90621 · 714-521-1464

EARN $80 PER HOUR
Part or full time
CLEANING ACOUSTICAL CEILINGS

Acoustic Clean™

With giant atomizing equipment and 9 special solutions • Clean up to 1000 square feet per hour • Renue ceilings up to 95% of original • Remove smoke, grease, and water stains.
Limited Dealerships Available. **Phone 800-328-4650 or 612-374-1105.**
Acoustic Clean, T.R.D. Corp. 2901 Wayzata Blvd. Mpls., MN 55405.
Send $3 for a complete catalog.

White's

Find twice the treasure . . .

in half the time

with a WHITE'S ELECTRONIC MINERAL/METAL DETECTOR

White's Instruments detect ringe, jewelry, coins, plus other valuebles end it's profitable! Metal detecting is a hobby for the whole family to enjoy. Models from $79.95. Covered by U.S. Patents.

FOR THE NEAREST WHITE'S DEALER AND A FREE CATALOG CALL TOLL FREE
1-800/547-6911 PA-2

WHITE'S ELECTRONICS, INC. 1011 Pleasant Valley Rd., Sweet Home, OR 97386

Power-Drill Operated
LOG SPLITTER
PATIO • PORCH • INDOORS

$249 FOB Factory

Splits With 5-Ton Force
24" Logs • Up to 20" dia.

A must for wood stove owners. Steel structure treme end double-edge blede. Two-way splitting ection is screw driven by your power drill. Use on sew horses or optional legs. Easy to move. Store inside.

Legs $15 Extra

FREE BROCHURE
Quix Corp.
Seymour, TN 37865
P.O. Box P

MAG-FIX
IDEAL SET-UP TOOL

Welco Mag-Fix is a powerful magnetic positioning tool. Its angular configuration holds rod, sheet or pipe with an extremely firm grip eliminating the need for clamps, jigs and fixtures. Mag-Fix is the welders ideal tool.

To order send $34.00 plus $2.00 shipping and handling to.

J & B Supply
P.O. Box 1311
St. Joseph, MO 64501

LOG SPLITTER PARTS
2-STAGE CAST IRON GEAR PUMP

Supplies 10½ GPM at 650 PSI until more pressure is needed. Then kicks down to lower GPM and up to 2500 PSI. Right hand rotation (direct couple) 3600 max RPM. Wt.

12 lbs	$118
13.2 gal use 5PH	$149
15 gal 2 stage use 8 plus hp	$163
22 GMP use with 10PH or greater	$249

4-WAY CONTROL VALVES

Built-in relief valve ¾" in-out ports, ½" cylinder ports. Item 2010 $40
With pressure sensitive detent on return stroke you don't have to hold handle. Item 2020 $59

Double-Acting Cylinders

3½x24" stroke, 1½ rod 52 lbs	$115
4x24x1¾ Rod Can go UPS	$138
4x24x2" rod H.D.	$150
5x24x2" rod	$204

NEW ENGINES

5 HP Tecumseh or Briggs recoil start ¾" shaft	$129
5 HP Tecumseh, recoil start 1" shaft	$180
10 HP Tecumseh, recoil start 1" shaft	$218
10 HP Tecumseh, electric start	$248
Vertical Shaft Engines available	
Heavy duty 15Ton Splitter complete	$830

Send $1.00 for discount catalog on Valves, Cylinders, Hoses, Frames, Tanks, Wedges, Slides, Wheels, Go Cart Parts, Splitters, Trailer Parts, Generators, or $6.00 for Catalog B Splitter Design & Fact booklet. We ship UPS

NORTHERN HYDRAULICS
1211 Cliff Road, P.O. Box 1261 Dept. PM104
Burnsville, MN 55337 (612)894-8310

LEARN Sign Painting
HOME STUDY OR IN CLASS COMB.

The Midwest School of Lettering and Design, an established full-time private career school, has trained students from all parts of the United States who are now successful sign painters and graphic designers in their own communities.

We now offer an exciting and thorough Home Study or in class combination course. There are no educational pre requisites — all you need is a genuine interest.

CHECK BOX ABO RETURN THIS AD ☐
FOR FREE CATALOG AND SAMPLE LESSON

MIDWEST SCHOOL OF LETTERING AND DESIGN
A DIVISION OF VATTEROTT AND SULLIVAN
10461 ST. CHARLES ROCK RD., ST. ANN, MO. 63074

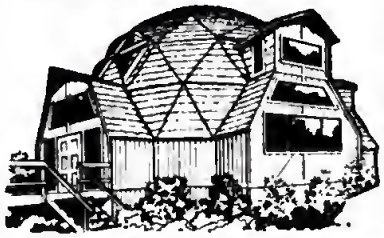
Spiral Stairs.
Before you invest hundreds of dollars send for our Handbook.

Learn everything you need to know about the finest spiral and circular stairs (shown in beautiful room settings). Mail coupon today for our free, full-color catalog.

Duvinage Corp. Box 828 Hagerstown, MD 21740

Name_____
Address_____
City_____ State_____
Zip_____ Phone( ) _____
Area Code
PM-10-82

Build this beautiful Dome Home by yourself!



Enjoy super affordable payments and low energy bills

Save up to 60% on building costs and up to 50% on utilities. Beautiful Monterey Domes geodesic home kits are extremely energy-efficient, unbelievably strong, earthquake resistant and easy to assemble. No special tools or skills necessary. Our unique patented building system makes home construction a reality for the novice.

Monterey Domes pre-cut, color-coded shell packages start at $3995. Models up to 3,500 sq. ft.

Send for our exciting color Catalog & Plans Book — over 90 fact-filled pages of beautiful affordable homes.

Write today! **Monterey Domes, Inc., 1760 Chicago Dept. AQ-10, Riverside, Calif. 92517**

☐ **Rush me your 90 page CATALOG & PLANS BOOK. Enclosed is $8.00, postage included.**
☐ **Also send your ASSEMBLY MANUAL for an additional $5.00.**

NAME _____
ADDRESS _____
CITY, STATE, ZIP _____

Mail To: MONTEREY DOMES, INC.
1760 Chicago, Dept. AQ-10
Riverside, Calif. 92517

MONTEREY DOMES

Be a DIESEL MECHANIC

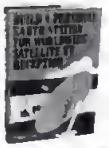
Train at home in spare time—No previous experience needed! Experts show you what to do, how to do it. No need to quit your present job or school. Easy-to-follow lessons with plenty of pictures cover everything you need to know to be a diesel mechanic. Approved for veterans.

ICS **Diesel School, Dept. PB092**
ICS Center, Scranton, PA 18515
Send for free facts! No salesman will call.

MANUAL TIRE CHANGER

Fix your own flat tires. Changer breaks bead demounts and mounts tire on rim. **$199.00 ppd.**, satisfaction guaranteed. Call or write

WIKCO INDUSTRIES, INC.
Rt. 2 Box 154 308-872-5327
Broken Bow, Nebraska 68822



Build a Personal Earth Station for Worldwide Satellite TV Reception

Enjoy direct TV broadcasts from virtually anywhere in the world by setting up your own TVRO station—complete instructions for constructing and installing a unit you can use with any TV! 304 pp., 201 illus. Hardbound. $15.95 Order No. 1409
Dept. PMX-1082X

TAB BOOKS Inc. Blue Ridge Summit, PA 17214

HOW TO BORROW **MONEY!**

[illegible] Satisfaction Guaranteed. Send $4.95 [illegible] TAB INC.

FINEST QUALITY

Master Assortment

How many ads have you seen over the years for hardware assortments? Each of them with a zillion little pieces that claim to meet every conceivable need known to man? For a price so low it's unbelievable?

Well, this isn't one of those ads.

WE SELL QUALITY

I'm Paul Reid, President of Reid Tool Supply Company. Our family-owned company has been in the mail-order business since 1948, supplying industry all over North America with specialized, high-quality tools. Recently we decided to use our knowledge of industry-standard tools to come out with a line of items for the home handymen or hobbyist.

Our Master Assortment pictured above is one of those items.

It's not intended to be the largest assortment on the market, although it is larger than some we've seen. Nor is it the least expensive, although it does cost less than some. Our Master Assortment does include, however, a very substantial 1,120 pieces of industrial-quality hardware that are all plated to resist corrosion.

POPULAR SIZES

At Reid Tool, we have spent a lot of time researching the most popular sizes of all these fasteners. Included are seven sizes of hex head cap screws, two sizes of hex nuts, six sizes of machine screws, two sizes of machine screw nuts, two sizes of lock washers, two sizes of flat washers, nine sizes of sheet metal screws, five sizes of wood screws, six sizes of cotter pins, two sizes of plastic anchors, and three sizes of wire nuts.

In short, I think we have the finest assortment available anywhere. Items that won't rust right before your eyes. Pieces that won't strip when you put some muscle on them. Sizes that make some sense!

CARRY IT WITH YOU

But maybe the thing that fascinated you most about the picture at the top of this ad is the box we pack our Master Assortment in. It's the neatest heavy-duty steel box I've ever seen. It can be latched and carried with you to the job. And that means no more fumbling around with glass jars filled with odds and ends. No more searching through rusty coffee cans only to discover you have to go back down the basement to get the right one.

Our 24-compartment box is manufactured of prime cold rolled steel, with a good strong latch and full-length cover hinge. When latched, the cover fits snugly, so items won't spill from one compartment to the other. Even the compartment bottoms are rounded to allow for easy removal of parts.

The box is finished in rust- and acid-resistant baked enamel in your choice of four colors: Medium Blue, Metallic Gray, Desert Tan, or Satin Black. It measures 13½"Wx9¾"Dx2⅛"H and weighs a hefty eleven pounds including the fasteners.

BEST HARDWARE VALUE

If you purchased all of the items in our Master Assortment in small quantities at the hardware store, we estimate you would spend nearly $100.00. Our price, including the box, is only $25.95. A terrific buy when you consider what you get.

But I want you to see, up close, our quality. So order your own Master Assortment and carry-box and look it over piece by piece. Then decide if you want to keep it. If for any reason you're not satisfied, return it in original condition within 15 days and we'll refund your money. No questions asked.

To order, just fill in the order form below and send it to us with a check or money order. Visa or MasterCard holders call toll-free **1-800-253-0405** (in Michigan call 1-800-632-0185). When ordering by phone, it's helpful to have the order form filled in and our item number handy so our operator can give you faster service.

Order yours today. It's a hardware value you'll appreciate for years to come.

ORDER FORM

Please ship _____ Master Assortments Item No. 10024 @ $25.95 plus $4.50 shipping and handling each (total $30.45). Michigan residents add $1.00 sales tax.

Ship to:

Name _____

Address _____

City _____

State _____ Zip _____

You must check color choice

Blue ☐ Gray ☐ Tan ☐ Black ☐

Enclose check or money order

Dept. PM02
P.O. Box 298
Muskegon, MI 49443

Reid Tool Supply Company

LOGHOG
LOG CARRIER

$14.95 plus $3.00 shipping and handling

We make it tough—not pretty.

It's made for the serious woodhandler. We make it from reinforced rubber and high tensile steel wire, so it's virtually indestructible. Designed to carry up to 300 lbs. If not fully satisfied return within 30 days for full refund.

Send check or money order to:
Specialized Services,
2118 Grand Ave.,
Granite City, IL 62040

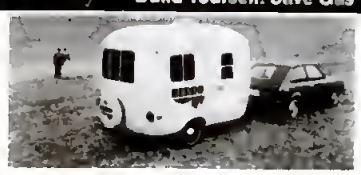
Mastercard and VISA orders 24 hours a day
1-800-525-9391 Ext 606
or within Colorado call
1-800-332-9259 Ext 606

Please send _____ Log Hog(s) at 14.95 each plus $3.00 shipping and handling. Illinois residents add 5¼% sales tax.

Name _____
Address _____
City _____
State _____ Zip _____
Allow 2 weeks delivery

BURRO
Fiberglass Travel Trailer Kit

Build Yourself! Save Gas



TRAILER FOR THE '80's—Burro Travel Trailer kit sleeps four. Under 1,000 lbs. Fiberglass. Ready to tow. Finish interior only. Write Burro PM10 14143, 21st Avenue North, Plymouth, MN 55441. For full color catalog send $3.00 to cover handling.

Rental Opportunities

Inventor Patents NEW Pogue-Type High MPG Carb!

CUTAWAY VIEW

Reports 67 MPG highway, 400 cid '78 Chrysler; much higher mileage, some tests ... and with other vehicles!

Is it here, a modern working version of the legendary Pogue high-mileage carb? Inventor Ray Covey says YES reveals secret! Sealed canister (above) is heated by hot coolant in coil, manifold gases in base. Fuel sprayed-in is vaporized, drawn into existing carb by engine vacuum on demand! System is NOT pressurized.

Covey's Vaporizer runs on "regular" high as 100 to 1 air/fuel ratio. Dual system instant change-over. Compact (about 8" high) under-hood device is reportedly safe, easy to build. Cost? Low as $75 with stock/used parts. Many units in use, but Covey seeks more performance data, many vehicles, before manufacturing Parts Kit.

Join our Road Test Team! Build a vaporizer for your car/truck. We'll send complete working plans, specs, instructions and parts list that can cost you NOTHING!

BUILD YOUR OWN AT LOW COST!

Write for FREE report, performance verification, Road Test Application!

COVEY CARB CENTER, Dept PM10
7530H East Alondra Blvd.
Paramount, CA 90723 - 1982

IS YOUR AIR HEALTHY?

ZESTRON IG-700 IONIZER CREATES MOUNTAIN QUALITY AIR INDOORS WITH A MAJOR BREAKTHROUGH IN COST-PERFORMANCE!

More than 10 times as effective than popular air filter units in removing smoke, pollen and dust!

IF YOU'VE UNPLUGGED OR ARE UNHAPPY WITH YOUR POPULAR AIR FILTER UNIT BECAUSE IT'S NOISY AND DOESN'T WORK, BUT STILL DEMAND FRESH AIR, THEN YOU'RE NOW READY FOR A ZESTRON IONIZER!

Remember how great the air smelled in the mountains, after a thunderstorm or near a waterfall? That clean fresh air was rich in negative ions, nature's own air cleaners. Pollution and civilization destroy natural air ions. A ZESTRON ionizer creates 30 Trillion air ions every second and lets you recreate that mountain fresh air on demand! ***Scientists claim that these amazing active ions can actually: Make you feel alive, revitalized and alert while relieving depression, headaches and allergies. Negative ions promote sound sleep, learning and healing and reduce absenteeism. Air ions destroy bacteria, make plants grow better and clean the air of smoke, dust, pollen, odors, solid pollutants, bacteria and viruses which fall to the floor as dust.*** (Write or call now for free independent scientific reports.) Our research shows that the ***ZESTRON IONAIR*** is the most cost effective air cleaner currently on the market. The IG-700 operates for pennies a month and has nothing to wear out or replace, like expensive filters.

IG-700

A solid-state pulse circuit breaker is used in Zestron ionizers which gives the greatest output (with no detectable ozone) at best value prices as shown below. The super powered Zestron output gives greater ion benefit, and cleans larger rooms (up to 40 by 40 feet) faster and more thoroughly than lower powered units. The Zestron IG-700 features adjustable output to let you set the ion level to your own preference. They have no moving parts and work anywhere in your home, office or business from standard house current.

Zestron ionizers are made in the U.S.A. using quality parts operating at fractions of their maximum values. They have been designed by engineers with years of high reliability spacecraft experience to give you many years of trouble free service.

The IG-700 features a remarkably compact 21/4 X 21/4 X 61/4 inch size for its outstanding output.

A free remote ion detector comes with each ZESTRON to verify and compare output. When you place the detector next to a ZESTRON and then a competitive unit, you will see greatly reduced or no ions from the competitive unit!

Don't buy any ionizer without comparing output!

ION GENERATOR COMPARISONS

IONIZER	Ions/cc/sec. (at 1 meter)	*PRICE*
ZESTRON IG-700	1,904,000	$99.95
Ion Cloud XL	840,000	$179.95
Executive Air	840,000	$189.95
Ion Breeze	880,000	$399.00
Ion Fountain	540,000	$129.95
Energaire	438,000	$79.95
Ion Cloud	350,000	$79.95
Ionosphere	350,000	$99.95
Modulian	75,000	$85.00
AirCare	72,000	$149.95
Omega 700	93,000	$245.00
JS&A Air Bubble	???	$89.95
Aspen	???	$89.95
Orbit	???	$79.95
Energen 402B	???	$149.70

CALL TOLL FREE (800) 372-1200
or (800) 636-2246
In Cal. (408) 371-1200

SATISFACTION GUARANTEED!

30 DAY FREE TRIAL–ONE YEAR WARRANTY
IG-700 $99.95 ea. 2 or more $94.95 ea.
Shipping add $2.50 ea. Calif. res. add 6.5% tax
Mail check, money order or VISA/Mastercard (send account no., exp. date) to:

ZESTRON, INC. Dept M10
867 McGlincey Ln.
Campbell, Calif. 95008

DEALERSHIPS AVAILABLE! (408) 371-1200

Make $15.00 an hour

Assemble **MAGNATRAC** Crawler Tractor Kit

Use it for your toughest jobs, then earn **extra cash** doing work for others. Buy factory-direct for greatest savings! Over 30 Attachments. Resale opportunities are great. For more information send now to:

STRUCK KIT, Dept. PM 102 Cedarburg, WI 53012
☐ **CATALOG** - showing Magnetrac Kit construction & money making uses - $1.00
☐ **PLANS** - for fabricating Magnetrac Tractor from local materials - $7.00 (Money refunded on any purchase)

SUNROOFS, Complete Installation Instructions w/Pictures

2 sizes 15" x 30" 129 PPD
17" x 35" 149 PPD
All Brass Chromeplated Hardware
Gloss Black Aluminum Frame
Removable Dot Safety Solar Glass

Current Monitor Siren Alarm Kits	42.00 PPD
Aluminum Van Ladder Or Roof Rack	29.00 PPD
200 PSI 12V Air Compressor, Built in gauge	49.00 PPD
4 4WD Suspension Lift Kits, Ford, Chev, Dodge, Mazda	180-300.00
New 5 Oal Military Dot Approved Gas Cans Red or Green	19.00 PPD
12 Volt Oscillating Fans	27.00 PPD
14" x 14" Hammond Roof Vents	25.00 PPD

Fog Lights, Driving Lights, Quartz Halogen Headlight Replacements

ODYSSEY
201-684-2180
Van, Pickup 4 x 4 and Auto Specialty Parts
715 Route 10 E, Whippany, NJ 07981
Send SASE For Free Brochure - Dealer Inquiries Invited

NEW SHIPMENT JUST ARRIVED

Hardened Steel For filing, drilling, milling, carving, routing any metal or wood. Cutting edges from ¼" to 1", all shanks ¼". Brand new in air tight G.I. packs.

32-Tool Set, G.I. cost $295.00 now $29.00
14-Tool Set, G.I. cost $120.00 now $18.00
Save Even More, Both Sets now $38.00
Two $38 Sets (Limited Time) ... $58.00
Money Back Guarantee. Add $3.00 for shipping.
Texas orders add 5% tax. Export orders add 14.
U.S. SURPLUS CENTER, Dept. 503
715 Camden, San Antonio, Texas 78215

NON-GUNS!

That's right, these precision-built replicas of famous firearms **CANNOT CHAMBER OR FIRE REAL AMMUNITION!** Made of machined metal, they look, feel and weigh same as the originals. **CAN BE DISASSEMBLED.** Over 30 blued, hand-finished parts. Comes fully assembled. Safe and perfect for display. **MONEY BACK GUARANTEE.** Send for FREE CATALOG of over 60 different models.

Model shown: U.S. GOV'T .45 AUTOMATIC, CO1U-81-300 **$50** (2.75)

The COLLECTOR'S ARMOURY, Inc., Dept. PM DELIVERY
800 SLATERS LANE, ALEXANDRIA, VIRGINIA 22313 CHARGE IN PARENTHESIS

PLANS AND INSTRUCTIONS FOR

Go Kart	$2.00
Mini Bike	$2.00
Mini car	$3.00
12' Sail Boat	$4.00
Front Traction Go-Kart with Gearless Differential	$10.00
Mini Jeep	$3.00
Pedal Boat	$4.00
8 H.P. Tractor	$10.00
Soap Box	$3.00

Mini Vehicles Plan
Dept.-C
Chazy, N.Y. 12921

HEX REthreader DIES

☐ #C7 Nut size NC DIES from ¼" to ½". Repair threads fast!
☐ #F-7 for Fine threads. 7 Pc. Set in plastic box saves time and $$ } **$5.50 Set Ppd**

5 Pc. TAP Set to renew INTERNAL Thrds.
☐ #T6C = NC ☐ #T6F = NF **$8.50 each**

Free Tool Gift With 4 Sets Only $22
Postage Paid. Satisfaction Guaranteed

JAW MFG., Box 213-A • Reading, PA 19603

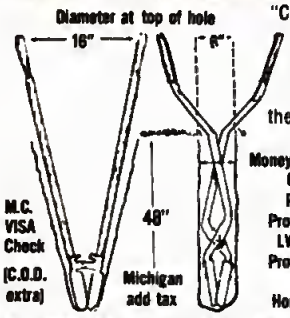
A SINGER'S DREAM!

REMOVES VOCAL FROM MOST STEREO DISCS

The Thompson Vocal Eliminator can actually remove most or virtually all of a solo vocalist from a standard stereo record and yet leave most of the background music untouched! Not an equalizer! We can prove it works over the phone. Write or call for a 24 page brochure and demo record.

Write to: **L.T. Sound**, Dept. PM, P.O. Box 336, Stone Mountain, GA 30086. Phone (404) 493-1258. COST $349.00

NEW CLEVER DIGGER



"Can Do" Digger (right) digs a straight hole all the way down, unlike the conventional digger, left.

Money back guarantee
Delivery included
PR61 Heavy Duty Professional: $74.95
LW56 Light Weight Professional: $34.95
LD49 Light Duty Homeowner: $22.95

M.C. VISA Check (C.O.D. extra)

Michigan add tax

IDEA INDUSTRIES P.O. Box 766 Union Lake, MI 48085

Full-Size TRADITIONAL ROCKING HORSE PLAN

Bring back the magic of childhood using our full-size plan for the Traditional Rocking Horse. Easy to build — body, legs and head are shaped using files. Rockers are curved for maximum action and shaped for desirable safety. Use pine or any available hardwood — paint to resemble live pony. Tomorrow's heirloom today!

Plan No. 121 $9.00

CATALOG
170 diff., full-size prof. furniture plans—$2.00 (catalog free with order)

FURNITURE DESIGNS, Dept PZ-102
1425 Sherman Ave., Evanston, IL 60201

Be a LOCKSMITH!

EARN WHILE YOU LEARN

Send for FREE BOOK

Big opportunities. Big profits. Earn quickly. Full or part time. Learn at home, it's easy. Do real jobs. All Tools—Materials Supplied. Lic. State of NJ — Appd for Veterans. Send Name and address for FREE book

Locksmithing Institute, Dept. 110-102
Div. Technical Home Study Schools, Little Falls, N. J. 07424

Portable Steam Cleaner

Steam in 60 seconds

CLEAN:
Engines, Air Filters, Lawn Mowers.
3 year guarantee on fire box, coils. Uses liquid soap, propane fired. Weight 120 lbs. Auxiliary pump required on low water pressure

WEDCO MFG. INC., Dept. M-13
940 West Broadway, Jackson, WY 83001

STOP HUNTING for SMALL mechanical parts!

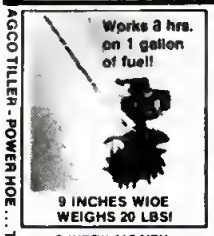
Giant new 768 page BOP Catalog for 1982 features over 24 000 inch and metric off-the-shelf parts: Timing belts, pulleys, chain drives, gears, motors, speed reducers, couplings, shafts, bearings, fasteners etc. for building, repairing, inventing any small machine, engine, model. Low prices. CATALOG 757 is just $5.95 POSTPAID

STOCK DRIVE PRODUCTS, DEPT. A
55 SOUTH DIXTON AVE., NEW HYDE PARK, N.Y. 11040

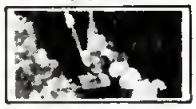
FREE METRIC/INCH CONVERSION SLIDE RULE INCLUDED!

GARDENING?
WANT A WEED FREE GARDEN? ... WITHOUT HARD WORK?

AGCO TILLER - POWER HOE ... TILLS DEEP ... WEEDS FAST AGCO



TILLS DEEP



2 WEEK MONEY BACK TRIAL PERIOD

WEEDS NARROW ROWS FAST!

NOT SOLD IN STORES FREE BROCHURE

WRITE TO AGCO P.O. BOX 75 DEPT P
SOUTHAMPTON PA 18966

NAME _____
STREET _____
CITY _____
STATE _____ ZIP _____

For Rush Delivery Of Literature Call 215-947-8855

TILLER - POWER HOE ... TILLS DEEP ... WEEDS FAST

FREE! HARDWOOD VENEERS & LUMBER CATALOG

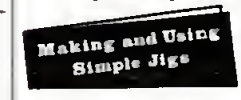
50 varieties world's rarest veneers and lumber at reasonable prices. Simplified veneering instructions plus full color wood selector included. Send for free catalog now and get special bonus starter offers. SAVE 25% Hurry!

BOB MORGAN WOOD, Dept. P01K31
1123 Bardstown Rd., Louisville, Ky. 40204

JIG BOOK FOR WOODWORKERS

The book for serious woodworkers. Shows how to duplicate parts & increase production. Over 80 jigs described & illustrated. Send for "Making & Using Simple Jigs" $4.25

Plans Catalog $1.00



ARMOR PRODUCTS
Box 290
Deer Park, NY 11729

DEAD NO MORE

The "Lights Off" from Renbar automatically reminds you to turn off your car lights. Simple to install, this never fail device fits all cars and will extend the life of your battery. Stamp Out Dead Batteries!
Send $4.95 (Florida residents add 25c tax) to Renbar Associates Inc., P.O. Box 502, Maitland, Florida 32751 USA. Postage and handling are inlcuded.

•DISH ANTENNAS •PREAMPLIFIER •RECEIVER 397 TOTAL PKG.

MDS complete receiving system reads for 16 hours of. All TV cables included

Satellite TV

NOW YOU CAN HAVE A 108 PLUS CHANNEL RECEPTION SYSTEM AND ENJOY EVERYTHING BEING TELECAST IN THE WORLD

Thoroughly updated 8x11 reference BOOK
Dish Antennas • Preamps • Receivers • Mfg's
Our BOOK is not OVERLY TECHNICAL MUMBO JUMBO but takes the mystery out of the sophisticated technology of satellite reception. The prestigious Massachusetts Institute of Technology and libraries worldwide have purchased this book. Now enjoy movies, Las Vegas shows, sports, news.

Satellite TV, Inc.
P.O. Drawer W DEPT. M-10, Boca Raton, FL 33432
Send me your book for $11.95 plus $2.95 shipping & insurance (U.S. funds) or call our 24-hour C.O.D. Line (305) 278-2941 (Info for authorized TV)
Name & Address

GAS TO ELECTRIC CONVERSION KIT

GAS LAMP BURNS $72 TO $120 OF GAS PER YEAR
RELITE OPERATES ON ONE TENTH THE COST OF GAS

Easy to install RELITE™ duplicates the charm and increases the light output on any gas light. Automatic ON-AT-DUSK—OFF-AT-DAWN photo electric control. Safe 12 volt or 115 volt 2 bulb fixture.

Good opportunity for high profit business, installing Relite.
Call 800-328-6504 or write:

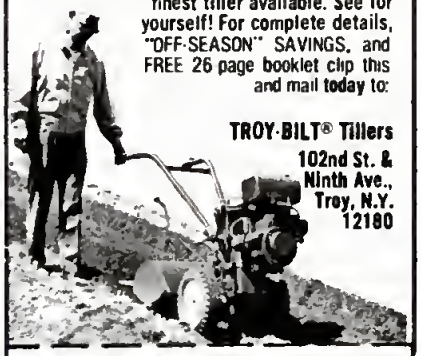
YARDLIGHTING SYSTEMS INC.
1039 CHARLES AVE., DEPT. 33 • ST. PAUL, MINN. 55104

TILLER USERS...

Can your machine do all of this?

- ★ Handle with just ONE HAND.
- ★ EVENLY break, turn & till soil.
- ★ Shred vegetation without tangling.
- ★ Leave NO WHEELMARKS or FOOTPRINTS.

The TROY-BILT® ROTO TILLER-POWER COMPOSTER can do all this and more! That's why serious gardeners consider it the finest tiller available. See for yourself! For complete details, "OFF-SEASON" SAVINGS, and FREE 26 page booklet clip this and mail today to:



TROY-BILT® Tillers
102nd St. & Ninth Ave.,
Troy, N.Y.
12180

TROY-BILT® Roto Tiller-Power Composters
Dept. A1482
102nd St. & 9th Ave., Troy, N.Y. 12180

Please send the whole wonderful story of TROY BILT® Roto Tillers including prices and "OFF-SEASON" SAVINGS now in effect for a limited time.

(Please Print Clearly)

Name _____
Address _____
City _____
State _____ Zip _____

©1982 Garden Way

BEAT the HIGH COST of LIVING!

LEARN UPHOLSTERY AT HOME... restore old chairs, sofas to like-new condition! A clean, enjoyable way to put spare hours to profitable use. Old cast-offs picked up for dollars, worth hundreds when reupholstered. Fascinating home study course includes tools, kits, supplies. Earn as you learn — start your own business!

SEND FOR OUR FREE BOOK TODAY! YOU'LL GET A BIG ILLUSTRATED 24 PAGE BOOK ON UPHOLSTERY and the upholstery business and a sample lesson showing how the fabulously successful MUI system is taught. It costs you nothing to get the information and there's no obligation. No salesman will call.

Modern Upholstery Institute,
80030 Field Bldg., Kansas City, Mo. 64111

GET STARTED NOW • MAIL THIS COUPON TODAY

Modern Upholstery Institute,
80030 Field Bldg., Kansas City, Mo. 64111

Please mail me a copy of your book, *"PROFESSIONAL UPHOLSTERY for Fun and Profit."* I understand no one will call and there is no obligation.

Name _____ Age _____
Address _____
City _____ State _____ Zip _____

SOTZ MONSTER MAUL

FAST-N EASY WOOD SPLITTING

$24.96 DELIVERED

LOWER PRICED THAN IN 1980

SPECIFICATIONS

Weight:	Head-12 lb. (Total weight 15 lb.)
Construction:	High-carbon steel head, hardened edge. High strength steel handle.
Guarantee:	1-YEAR TRIAL OFFER + 10 years against failure.
Price:	**$19.96** Factory pickup. **$24.96** Delivered to your door.

VISA or MASTERCARD RUSH ORDERS
CALL TOLL FREE 1-800-321-9892
Inside Ohio 1-216-236-5021
OR SEND CHECK OR MONEY ORDER.
Sorry No C.O.D.'s

- Splits most logs in one lick–won't stick.
- No struggling lifting heavy logs up to high priced power splitters.
- Drop 'em, saw 'em, stand 'em up, and split 'em!
- Forget about lost, stuck, or flying wedges.
- No gasoline, no set-up, no take-down.
- No wooden handles to replace.
- No gimmicks. Just simple physics!

We at Sotz have been making the same quiet offer for years: Try a Monster Maul at our risk! Within one year, if you don't think it's the fastest, least tiring method of splitting firewood, let us know, and we will give you your money back, including shipping . . . Plus, it's guaranteed against failure for 10 years.

OUR 26TH YEAR

24" OAK

Sotz Corporation, 13643 Station Rd., Columbia Station, OH 44028

WORKS WHEN OTHERS WON'T

Thanks for very prompt delivery of my 12M Maul. Have "tested" it already on 13" dia. oak 24" long. Works when unable to split with any other hand tools. Everything you say it is.

Bob Fitzpatrick, Souder, Mo.

MONSTER BEATS MACHINES

Last summer I ordered a Monster Maul. It does such a terrific job. I would like one for my nephew. I have a screw splitter and also a hydraulic splitter, this Monster Maul beats both of them. Only this week I was visiting my sister. . . She had a big pile of stringey oak, that had been cut about 4 weeks. I put my cone splitter on, thinking it would do the job. I found out the only good job was done by my M-12. . . maul.

A. Chandler, Lancaster, Ca.

MONSTER MAKES HIM A BELIEVER!

Quite frankly, I ordered the "Monster Maul" because of your no risk money back guarantee. I figured I would try it and if it didn't work out I would return it and the real loss would be yours, not mine. Well, you won't be getting it back. You made a believer out of me. . .the Monster Maul does get the job done and for the money, it's the best bargain around. Thanks for a darn good product at a price that is "easy" to live with.

John Geras, Bolingbrook, Ill.

A SURPRISED BELIEVER

I have really been impressed with your 12# Maul. Prior to purchasing it I had used a 8# Go-Devil which had the problem of getting stuck..This was a time consuming problem. I saw your ad on the Monster Maul in one of my farm magazines, and decided to try you out. I must admit I was doubtful that it would work as well as your ad showed. I had several large pieces of oak that had been giving me fits trying to split. I unpacked my new Monster Maul and took it out to the old wood pile. Was I surprised, even though it was 4 lbs. heavier than my old go-devil it was much easier to swing. (Seem to be much better balanced.) It never stuck once, and did I ever split that oak up. A believer I became. My biggest problem now is keeping my neighbors away from it so I can use it myself. Please find enclosed my order for a Lift-N-Saw. I really apreciate your products.

J. Allen, Greenville, Tenn.

LANGLEY'S PLEASURE

Ker Paw!!! means one good swing with my Monster Maul and my block of wood is cut in two. What a wood splitter it is and the metal handle is no draw back at all. I've always liked to cut and split wood, but my...Chain Saw; my Sotz Lift-N-Saw, and my Sotz Monster Maul has taken the chore out of it, and replaced it with pleasure.

Tom Langley, Canon City, Co

PROVIDENCE

I first saw your Monster Maul advertised in Mechanix Illustrated. . . I was truly amazed when I discovered that it actually performed EXACTLY the way you said it would. Not one single testimonial that accompanied the maul was overstated in even the smallest detail. . . I quartered 3½ ft. long green fir log sections, 18" to 30" dia., with four swings. . . I only weigh 160 lbs. . . and it was in no way exhausting. When I see others weighted down with two mauls and two wedges to do the same job I do but take twice as long, I count it as Providence that I responded to your ad before I threw my money away.

Dave MacGregor, Washougal, Wa.

DON'T GET SUNK

I'm very pleased with my single 55 gal. barrel kit and am adding the top unit. I must say I was skeptical at first but am very impressed with the performance. I'm just glad I didn't sink 4 or 5 hundred in a fancy but less functional stove. Thank you for a quality functional product at a fair price and with good service.

Jon Jackman, Carterville, Il.

MEN'S TOYS!

You know that old saying "The only difference between men and boys is the price of their toys". Well my husband received his Monster Maul, he was like our son when he gets a new toy. Both my husband and I were and are real pleased with the way the maul splits those logs. My husband's splitting time was cut virtually in half. Thanks for your fantastic Monster Maul. From the wife of a very satisfied customer.

Brenda Conine, Ketchum, Ok.

15½ Ton Vertical Splitter

Splitting tough wood? That's when those 7 to 10 ton light duty splitters just don't hold up. You need a splitter that's heavy duty and easy to handle.

The new 15½ Ton Vertical Splitter gives you this, plus quality components and versatility. With features like, heavy duty frame, large 520x8 high speed 4-bolt tires, 24" stroke, 2-stage pump for fast cycles, and auto detent valve.

Get all these values at Northern Hydraulic's low introductory price
Item #1160 $1190

Freight in 48 states $80

Other Models Available:
15½ Ton Low Profile $855
15½ Ton High Profile $855
24 Ton Low Profile Item #1142 . $1385

Write for a FREE splitter brochure or send $1 for Northern Hydraulic's complete Discount Catalog with listings of all the parts you'll need to build your own log splitter.

Northern Hydraulics
P.O. Box 1261 Dept. PM10-6
Burnsville, Minn. 55337

QUICK & EASY ORDERING
CALL (612) 894-8310

WOODWORKERS!

A magazine for both novice and veteran bringing you over 75 project plans per year...for building the best of Early American, Shaker, English, Contemporary furniture, clocks, toys, lamps, gifts and much more...

ALL FOR LESS THAN 20¢ PER PLAN

Plus Regular articles on shop tips, jig-building, finishing techniques and money-making ideas.

1 YEAR (6 bimonthly issues)—only $12.00
2 YEARS (12 bimonthly issues)—only $22.00
Foreign Rates 1 year—$14.00 2 years—$26.00
(Please make payment in U.S. Funds)

The Woodworker's Journal
P.O. BOX 1629 · 10 NEW MILFORD, CT 06776

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

money back if you're not satisfied

Rocking Horse Plan

Finished size 25" x 36". Full-size plan $5.50
ARMOR Box 290, Deer Park, NY 11729

YOU CAN MAKE YOUR OWN MUSICAL INSTRUMENT!

A kit makes it easy, and needs no power tools
Kits Priced from $25
Write for free catalogue
HUGHES DULCIMER CO.
4415 West Colfax Ave. PMS
Denver, Colorado 80204

WORLD'S SMALLEST 2-IN-1 SPOT LITE & FLUORESCENT LANTERN
SHIRT POCKET (6½" long)
$6
BURGLAR ALARM $7
$7.00 (plus P & H $2.75)
14" (overall) car FLUORESCENT light (Operates on 12 volts car
15 day MONEY BACK GUARANTEE
Insured Postage & Handling Extra
ACANOIA ENTERPRISES,
P.O. Box 5076, Bellingham, WA 98227

Burglar • Fire Protection

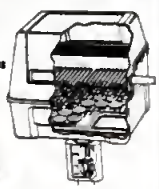
Protect Your Life, Home, Business, Auto, etc.

- Our catalog shows how Install your own alarm systems and devices and save $$$$. We offer FREE write-in engineering service.

FREE CATALOG Lowest Prices on Reliable, High-Quality Alarm Systems and Devices

Burdex Security Co. Box 82802-PM Lincoln, Ne. 68501

GAS GRILL PARTS
FOR OVER 80 BRANDS



• Burners • Grids • Grates • Cooks • Accessories

QUALITY REPLACEMENT PARTS
SATISFACTION GUARANTEED

FOR FAST SERVICE CALL:
800 828-8004
800 400-6788 (N.Y.S.)

KM Gas Grills
810 Norton Street
Rochester, N.Y. 14621

Be an ELECTRICIAN

• MAINTENANCE
• CONTRACTOR
• CONSTRUCTION

Make more money! Check out Electrician's wages against the kind of money you make now!

TRAIN AT HOME IN SPARE TIME

Make extra money in spare time while you train for a full-time job. Do odd jobs for friends and neighbors. Save money doing your own electrical work. Learn everything from repairs and maintenance to complete electrical installations. No previous experience needed. Everything explained in easy-to-understand language with plenty of drawings, diagrams and photos. Tools, materials, test equipment included with course. Approved for Veterans and G.I.'s. Be ready to take almost any electrician licensing examination offered by state, city or county. No cost, no obligation, no salesman will call!

ICS SINCE 1891 *MAIL COUPON TODAY!*
Electricians School, Dept. PM092
ICS Center, Scranton, PA 18515
Rush free facts that tell how I can train at home in spare time to be an electrician

ELECTRICIAN GREAT MONEY-MAKING CAREER

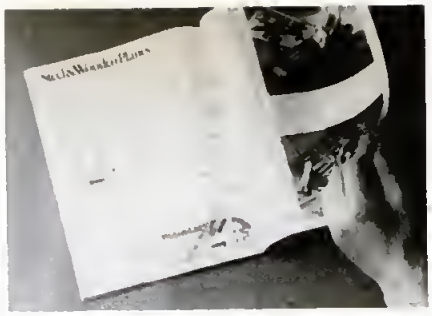
NAME _____
ADDRESS _____
CITY/STATE/ZIP _____

RUPTURE *APPLIANCES*

FOR COMFORT!

When you slip into a genuine BROOKS Appliance you can enjoy heavenly comfort night and day at work or at play! Thirteen million sold, since 1880. You buy direct from the factory - never sold in stores - beware of imitations. Only the highest quality materials and workmanship. (Especially for older people who wish to avoid unnecessary operations for reducible rupture). Send for our FREE illustrated booklet with no obligation.

BROOKS APPLIANCE COMPANY (Medicare Pays 80%)
Dept. 771, Marshall, Mich. 49068



Turning into a better craftsman can be as simple as turning the pages of our new catalog.

Our new 244 page catalog is filled not just with pictures of great hand and power tools, but carefully written specs, detailed illustrations and recommendations from craftsmen who've spent much of their lives making, using and testing tools.

You'll know what they look and feel like, and you'll know how they fit your needs.

We believe you're not the average craftsman. So why should we give you an average catalog?

Garrett Wade Co., **Dept. 104**
161 Ave. of Americas, N.Y., N.Y. 10013
Please send me your 244 page catalog of wood working tools, machinery and accessories. Enclosed $3.00.
Name _____
Address _____
City _____
State _____ Zip _____

SANDING BELTS

	Per Doz.		Per Doz.
1×42 Mead, etc. . .	$ 7.50	4×21¾ Skil	$13.90
2×17⅜ Burgess . .	7.70	4×24 Misc	14.25
2×21 Porter Cable	7.80	4×27 Porter Cable	14.50
2¼×21⅝ Skil . .	8.95	4½×26 Skil	15.50
3×18 Wen, etc. . . .	8.50	4×36 Hammond . .	17.50
3×21 Porter Cable	10.50	4×37⅜ Atlas . . .	17.75
3×23⅜ Skil, Thor.	10.85	4×52½ Walker . . .	20.95
3×24 Porter Cable	10.60	4×54 Porter Cable	21.25
3×27 Porter Cable	11.00	8×48 Delta-Sears .	36.75

1 All belts cloth backed 2 Specify for wood or metal
3 Will Ship Assorted — Or Specify Grit
4—MONEY BACK GUARANTEE
5—Other sizes available at lowest prices—Please Inquire
Include $2.00 for postage and handling. Send check or money order. NYS Res. Add Tax.
JACKSON TOOL CORP., DEPT. LJS
27-55 Jackson Ave., Long Island City, N.Y. 11101

POWER HACKSAW

$62.50 **WORKS BEAUTIFULLY**

Easy to assemble kit of cast iron parts. Use your own ¼ hp. motor. ½" drill press needed for finishing work. Moves approx. 120 strokes/min. Send $62.50. Catalog describing this and 51 other kits, only $1.00. Write: Casting Specialties, Dept PM102H, Cedarburg, Wis. 53012

GREAT SAUSAGE RECIPES

227 page **illustrated** book **explains sausage making** plus home curing and smoking of meat, fowl and fish. Over **100 recipes. Free** equipment and supply catalog has more information.
For yours, send to:
The SAUSAGEMAKER
177-6 Military Road Buffalo, N.Y. 14207

CLASSIFIED ADVERTISEMENTS

Rate: **$5.25** per word payable in advance each insertion. Minimum insertion ten words. Bold face capitalized words—**$1.00** per word additional (First word set in Bold Face at no extra charge, Zip Code Free.) The next available issue to place an advertisement in America's No. 1 Classified Section is **DECEMBER.** The closing is **OCTOBER 5th.**

Send remittance payable and order to Popular Mechanics, ATT.: Hildegard E. Kappel, Class. Adv., Mgr., 224 West 57th Street, New York, New York 10019. Please indicate Heading under which ad is to appear. As a consumer service and in cooperation with our mail-order advertisers who use post office box addresses for their convenience in handling your order, Popular Mechanics maintains a register of such mail-order advertisers containing their complete names and street addresses.

Advertisers using P.O. Box number must furnish complete name and street address for our records.
To avoid delay in the publication of your ad, please send descriptive materials with your request.

CHRISTMAS GIFT SHOPPING

DISTINCTIVE Gifts, Free Colorful Catalogs. **USAPMO,** 8803 Edgemoor, Houston, Texas 77036

GENERATOR FLASHLIGHT: No batteries needed. Ideal for emergencies. $8.50. Tanglewood Treasury, 914 Tanglewood Lane, Vineland, New Jersey 08360

FREE CHRISTMAS CATALOG. Hundreds excellent gifts. Jeannie's Gifts, 96 Lee's Creek Road, Asheville N.C. 28806

DISTINCTIVE Gifts, Bargains—Bonuses, Gifts, Catalog $1.00. $2.00 Refund. Franklin, 1601C Elizabeth, North Chicago, IL 60064

SHOP By Mail. Gift Catalog 20¢. Mark Anthony's, 3841 Hammel, Los Angeles, California 90063

PECANS, Direct From Farmer, Top Quality, $1.75 Per Pound, Five Pound Minimum. Add $2.50 Per Five Pound Order for Shipping. Send Check or M.O. To: Sam Reeves, 2323 Cherry St., Montgomery, Alabama 36107

SAVE 40% Off unique gifts. Giant color catalog $2.00. **GIFTS, ETC,** P.O. Box 5432, Corpus Christi, TX 78405

FREE CATALOG! Over 150 Gifts! Write: LeLand Gifts, 825 Federal Road, Brookfield, CT 06804

AUTOMOBILES

LEGENDARY Pouge Carburetor! Patent drawings and instructions-$3.00. Money Back Guarantee. Guaranteed. Caprock, Box 30682, Amarillo, TX 79120

LIFETIME Air Filter. Stops More Dirt; Holds More Dirt. Engine Runs Better, Lasts Longer. Inexpensive. Send Stamp. Write: Gott, 929XX Barnett, Vincennes, IN 47591.

INSTALL TURBOCHARGED DIESEL in car, PU, RV for under $1500. Get 30 MPG. Overlooked source US diesels, 550#, 6 cylinders. Thousands cheaper than Perkins, Deutz or Murphy. Send self Addressed Stamped Envelope for free info. Diesel Department, Box 1933, Walla Walla, WA 99362

OLD CAR FANS: subscribe to **HEMMINGS MOTOR NEWS,** world's largest old car marketplace since 1954. Over 450 pages of ads each month, crammed with thousands of old cars for sale — plus parts, literature, restoration shops and more. Only $13.75 for 12 giant issues. Subscribe to the Bible of old car nuts today. Send to: Hemmings Motor News, Dept. MP, Box 100, Bennington, Vermont 05201

PROPANE-METHANE-NATURAL GAS Conversions. **CARS-TRUCKS**-Build Yourself. **THOUSANDS SATISFIED USERS!** Write: Fleming Engineering, KPM, Remsen, NY 13438

SAVE GASOLINE!! Bypass pollution devices - - easily, reversibly! Posco (GB-10), LaGrangeville, NY 12540

PROPANE/GASOLINE DUAL-FUEL AUTO! Conversion Plans and Instructions, Parts Sources. Only $10.00! ROA, Box 873, Concord, NC 28025

HIGH Mileage Carburetors. Free Details. Box 89, Draper, Utah 84020-0589.

HIGH MILEAGE VAPOR CARBURETOR Complete working plans. SASE. Kniess, R2-PM, Bowling Green, MO. 63334

FOR any car extremely effective antitheft device. Only $7.95. Money back guaranteed. Beta Industries, Dept. 201 Box 2296, Elizabeth, N.J. 07207

FAMOUS POUGE CARBURATOR PATENTS —Drawings-Text- Everything! $3.95 - Fleming Engineering, Dept-L, Remsen, NY. 13438

SAVE MONEY WITH YOUR CAR New vapor carburetor plans triple or quadruple your mileage information $1.00, plans $10.00. Kits available proven design. FCR, BOX 478, Higganum, CT 06438

FORCE FEED HUNGRY CYCLINDERS — Get 3-5 more miles per gallon. Cost for parts less than $10.00. Requires Emission control Air Pump Systems. Send $9.95 for Instructions and parts list. Reymond Smith, 508 Hugh Street, Parkersburg, West Virginia 26101

55 WAYS TO BETTER GAS MILEAGE. $3.00. R&S Enterprises, 10P, P.O. Box 2266, Muscle Shoals, AL 35660

RABBITERS: Squeeze more from your VW. "Getting The Most From Your Rabbit", 400 - illustration book unlike any VW manual. Covers **All** Rabbits. $10.00 postpaid. Rabbit Book, Box 700, Edgewater, Florida 32032

SAVE BIG!! SUPERTUNE YOUR CAR FOR SUPER MILEAGE INCREASE. Simple. Easy. Inexpensive. DIY Project. **FREE** Information. Apollo-1J, Box 370, Olustee, OK 73560

INCREASE MPG Enormously. Improve EPA exhaust standards. Easy installation. U.S. Pat. No. 4291660 Send $69.95 (ck. or M.O.). Molyneaux, P.O. Box 81, Jamaica, N.Y. 11430. (Allow 6-8 wks delivery).

AUTOMOBILE RETUNING FOR MAXIMIZED ECONOMY. Simplified techniques greatly increase MPG performance. **DETAILS FREE!** Technearing, Box 1506B, Princeton, NJ 08540. **CALL TOLL FREE** (800) 526-0907. (Recording)

(SAVE THOUSANDS)! Tired of your cars rusting out? Keep your cars rust free almost forever. Send $3.00 for my booklet. Action Enterprise, Inc., Box 24, Rte. 12, Frenchtown, N.J. 08825

RUST PROBLEMS? New liquid rust killer product. Guaranteed Money Back. 8oz. $5.45, quart $10.95 postpaid. JRF & Associates, PM-10, 3171 Fernway Drive, Montgomery, AL 36111

15-40% MILEAGE INCREASE GUARANTEED. International Company, sales 100 million, has **PROVEN** device. Distributors needed some states. Complete literature, information send $1.00. P.O. Box 110291, Arlington, TX 76007. (817) 265-6190.

SAVE Gas! Plans for Fuel Efficiency Gauge. $3.00. Vincent's, 283 Elmwood Ave., Lockport, N.Y. 14094

SCREWING Around With Metric S.A.E. U.S.S. Bolts and Nuts. Finally A One Piece Gauge That Measures Them All. Send $4.50 to: Gaugit, P.O. Box 156, South Elgin, Illinois 60177. Guaranteed!

RUSTPROOFING Save $5.00. Stop Rust, P.O. Box 8542, Ft. Lauderdale, FL 33312

SAVE $$. Recycle your oil. $1.00. P.O. Box 11094, Santa Rosa, CA 95406

JOIN AMERICAN TRUCK HISTORICAL SOCIETY. Receive **WHEELS OF TIME** Bi-Monthly. $15/Year. **ATHS,** 201 Office Park Drive, Birmingham, Alabama 35223

HOW TO MAKE good car fuel for 10¢ per gallon. Details $1.00. Westex International, POB 60896M, Los Angeles, Cal. 90060

FREE INFORMATION!! Incredible MPG Possible !! Write! ESP-127, 377 Anteriar, Pittsburgh, Penna. 15210

PUSSYFOOTIN'? nope. Low down skinny on these eds? yup. Sample $1.00 (24 pages). 2nd Opinion, Box 1095, Klamath Falls, OR 97601

INCREASE TIRE MILEAGE! Tirs Life keeps air pressure accurate up to 6 months. Low air pressure wastes gas and tread life. Used by commercial fleets for 20 years. One package per midsize car. Send $9.95. Fuller Bros., Inc., 5620 S.W. Kelly, Portland, OR 97201

SUPER MBG Systems!!! Revealing Details—SASE. Research, Box 322, Montrose, CO 81402

GASAVER THAT WORKS! Details. Action Industries, Box 201M, Neillsville, WIS 54456

INCREASE ENGINE POWER/MPG. Electronic Ignition For Car With Points. Complete Assembly Plans, Instructions, And Parts Suppliers. $3.00. DJC, Box 132, Iron Mountain, Mich. 49801

AUTOMATIC TRANSMISSION TROUBLES? SAVE MONEY! Professional Adjustment Procedures. Bands, Fluid, Filter Advice. Send Details end $3.00. TransTips, P.O. Box 7898, Tahoe City, CA 95730

SURE FIRE REMEDY—DROWNED OUT ENGINES! Never again stranded! Cars - Bikes - Boats. Send $2 Plus Self Addressed Stamped Envelope. **GUARANTEED REMEDY! BEST REMEDIES, BOX 331, TACNA, ARIZONA 85352**

DRIVE Late Model Cars at no Cost, the way your Dealer does. Insider, Box 9051P, Richmond, VA 23225

ELECTRIC VEHICLES

ELECTRIC CAR PARTS. Catalog contains parts, conversion plans, technical information. Send $3.00 to Flight Systems, EVCC-2, P.O. Box 25, Mechanicsburg, PA 17055

AUTO SUPPLIES & EQUIPMENT

HYDRAULIC JACK Repair Manuals and Kits. Catalog $2.00. Hydraulic Jack Inc., GPO Box 3, Staten Island, N.Y. 10314

ALTERNATOR Generator Rebuilding Book. Price. Hedelund Engineering, Box 26024, Las Vegas, NV. 89126.

PICK-UP - VAN Construction - Boat Racks **ADJUSTABLE** to All Sizes. **FREE** brochure. EZWAY, Box 681, Ontario, OR 97914

CORVAIR PARTS New Gigantic Catalog: $4.00. Clark's **CORVAIR** Parts, Inc., Dept. P, Shelburne, MA 01370

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501-0751

GARD-A-CAR! Latest technique in auto protection. Free Brochure. DBW, Box 524, Yeadon, PA. 19050

SCATPAC sensational new product guaranteed to increase **MPG,** Kniess, R2-35EPM, Bowling Green, MO. 63334

AUTOSOUND wholesale catalog $2.00. Installation guide $3.00. State year, model, & make. **CARFACTS,** Box 2008, Westford, Mass. 01886

GET 110 VOLTS A/C by Converting Car Alternator. Details . . . A/C, 323 River, Northville, MI 48167

SPARK PLUGS . Reconditioned Name Brands . . . Warantee . Packaged . Fantastic Savings . . Galaxy, P.O. Box 1062, Marietta, Georgia 30061

MOTORCYCLES, BICYCLES, MOTORSCOOTERS & SUPPLIES

GO KART, MINI-BIKE, MOTORBIKE PARTS. Tires, Clutches, Motors and Complete Carts and Mini-Bikes at Discount Prices. 3½ Hp. motors $106. 5 Hp. $123. Send $1.00 for Booklet. Northern Hydraulics, P.O. Box 1221, Dept. PM-MB, Burnsville, MN 55337

GO KARTS, Minibikes, ATV's. Kits, Parts. Lowest Prices. Catalog $2.00 Refundable. Kart World, Dept. C, 1488 Mentor Ave., Painesville, Ohio 44077

HANG GLIDING, AVIATION

PILOTS Delight, U.S. patented Triplane. The worlds lowest priced aeroplane ever flown, featuring safety, economy, simplicity. Amazing facts. Send $3.00 for brochure, with pictures. Adress Co-Inventor, 2809 Meadowbrook Dr, Fort Worth, Texas 76103

PROPELLERS HUBS, for **SMALL AIRBOATS, HOVERCRAFTS, BALLOON INFLATORS.** Universal Propeller, 1905 Milam, Fort Worth, Texas 76112

ULTRALIGHT ENGINE Lowest price. Details $1.00. Westex International, POB 60896M, Los Angeles, CA 90060

DESIGN Build Airplanes, Hang Gliders, Simplified Publications. Brochure 20¢. McCoy Aircraft, 12820 S. Figueroa, Los Angeles, CA 90061

BUILD and **FLY** inexpensive **AIRPLANES** and **HELICOPTERS.** Proven plans, flying for years. Informations: $5.00. Polynova, Box 870M, St. Remi, Quebec, Canada JOL 2LO

AIRBOAT Propellers. Catalog $3.00. Askey Propeller Co., RT. 2, Box 174B, Keller, TX 76248

BUILD, Fly 100+ Ultralights - Kits, plans! Catalog, thorough guidebook $12.00. Aerofun-M, Salida, CA 95368.

SPACE & ASTRONAUTS

ANTIGRAVITY Propulsion Device. Free Brochure! ROA, Box 873N, Concord, NC 28025

HOVERCRAFT

AERO-CAR Amazing Hovercraft built easily with ordinary tools. Lawnmower engine power. Carries one man plus. Hovers, flies forward, backward. Sideways over land/snow/water. Complete construction plans and brochure. $9.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

HOVERCRAFT Plan All Sizes. Catalog $1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

HOVERBIKE! Fantastic Lawnmower engine powered, rally proven hovercraft. Free information. Blueprints & Manual-$9.00. Venture, Dept. PM10, 871A2 Moe, Akron, Ohio 44310

(Continued on next page)

HOVERCRAFT

(Continued from preceding page)

BOOMERANGS— INCREDIBLE Comebacks! Select, Omega, Traditional Shapes . . . Exciting Fun. Unique Gift for Friends/Family. Free Catalog. BoomerangMan, 306 Park, Monroe, LA 71201

CB-RADIO, TV & HAM EQUIPMENT

POLICE Scanners, Crystals, Antennas, CBs. HPR, Box 19224, Denver, CO 80219

LINEARS - Send Stamp for Details - MATCO Electronics, Box 316C, Cadillac, MI 49601

BEARCAT Scanners. Discounted. **CRYSTALS** $2.75. **RADIOSALES,** 3462 Oakland, Oshkosh, Wis. 54901

BUMPER STICKER - Handle/Call letters, one to three line message, $2.95. **MARILYN,** P.O. Box 291, Dunedin, Florida 33528

ELECTRONICS

GOVERNMENT Surplus receivers, transmitters, snooper-scoopers, parts. Catalog 25¢. Meshna, Nahant, Mass 01908

MECHANICALLY INCLINED? Assemble Electronic Devices, your home. Knowledge, Experience not necessary. Turn your Spare/Full time into cash. No Investment. Free details write: Electronic Development Lab, Box 1560PM, Pinellas Park, FL 33565

COMPUTERS

COMPUTER PROGRAM in basic language to handi-cap race horses. Includes documentation and directions. Order **COD** or send $14.95 in check or money order to: Handi-Caper, P.O. Box 4896, Framingham, MA 01701.

TRS-80 COMPUTER DISCOUNTS. Lowest prices anywhere. Free price list. Radio Shack, 175B N. Delsea Dr., Vineland, NJ 08360. 800-257-0426.

PERSONAL COMPUTER Books, Programs, Accessories, over 2000 Fully Described. All Major Brands, Catalog $2.00 (Refundable) JMC, 1025P Industrial Drive, Bensenville, Illinois 60106

BOATS, OUTBOARDS, TRAILERS & KITS

BOATKITS - PLANS - PATTERNS - FRAMEPACS - FIBERGLASS MATERIALS - World's largest catalog - 300 Designs - 8'/80' - Plywood - Fiberglass - Steel - **POWERBOATS** - Inboards - Outboards - Cruisers - Sportfishers - Hydroplanes - Runabouts - **KAYAKS CANOES** - Large Selection - **SAILBOATS** - Daysailers - Trailersailers - Multihulls - Motor Sailers - **FIBERGLASS** - Cloth - Resins - Foam- C-Flex - **CATALOGS** $2.00 - "Includes **FREE** Materials Brochure - Hardware - Fastenings - Equipment - Riggingsails - Glue - Etc." - (Book "**AMATEUR BOATBUILDING**" - In - fiberglass - Plywood - Epoxy/Wood Saturation Technique - $6.00). **CLARKCRAFT** - 16-P Aqua Lane, Tonawanda, NY 14150

KAYAK-CANOES-PLANS-KITS-PATTERNS- Large selection in fiberglass-plywood-**CATALOG** $1.00 (with Boatbuilders Guide - $2.00) - Clarkcraft - 163 Aqualane, Tonawanda, NY 14150

REPAIR YOUR OWN BOAT with **BOAT BOND** - polyester putty fills nicks, scratches, gouges, small holes. Fiberglass-wood-metal-concrete. pt -$7.50, qt -$12.50 ppd. Boat Bond, Rt.#1, Box 456, La Place, La. 70068

EVINRUDE 1981 Bargains . . . all sizes . . . Scott McCulloch parts . . . $1 handling . . . Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

FIBERGLASS - RESINS - Foams - cloth - epoxies - mat - etc. Factory prices - **CATALOGUE** $1.00 - (Book "**COMPLETE FIBERGLASSING**" $6.00) - Clarkcraft, 16-PI Aqualane, Tonawanda, NY 14150

BOAT PLANS - Frame Kits - Patterns - Hundreds of designs - Wood - Fiberglass - Steel - Powerboats - Sailboats - Outboards - Canoes - Kayaks - Rowboats - Houseboats - Duckboats - Sportfishers. Easy, proven methods include Instructions especially for amateurs to assure professional results. No Lofting! Supplies" - Fasteningsa - Fiberglass - Resins - Glues - Spars - Books - Trailer Plans. Huge 144-page catalog - $2.00. Includes Free "Boatbuilding Supplies" brochure. Glen-L Marine, 9152 Rosecrans, Box 756MP, Bellflower, CA 90706

BOAT KITS - 27 trailersble models - **POWER** and **SAIL** - 8'-30'. Molded fibarglass hulls and decks come factory assembled - you install factory supplied intanor. Save half factory-built cost. No experience required. 48-page catalog - $1.00. Luger, Dept. BC-82, 3800 West Highway 13, Burnsville, Minnesota 55337. 612-890-3000

"**GO FLY** —a—kite" —**SEND** $1.00 for 1982 color Catalog. We have kites for all seasons, **WRITE:** 'Kites", P.O. 1317, Boyton Beach, FL 33435

CAMPING EQUIPMENT AND TENTS

FREE Catalog. Everything for camping. Campmor, Box 999N, Paramus, NJ 07652

ATHLETIC AND BODY BUILDING COURSES

DEFEND YOURSELF! Don't back down. Learn how to block a Punch and hit hard. Practice at home. Send for **FREE** Details. Boxing, Box 642, Berwyn, PA 19312

BIGGER, More Powerful Muscles - faster!! Free Booklet! Universal, Box 6694A, Detroit, Michigan 48240

KUNG-FU Free Literature. McLisa, Box 1755, Dept.-PM-82-J, Honolulu, Hawaii 96806

SPORTING GOODS AND EQUIPMENT

BOWLERS Improve Scores, Raise Your Average. Illustrated Booklet Shows How $2.00. Bowling, Box 613, St. Charles, MO 63302

POOL CUES your kids will pass on to their kids. Unique St. Croix construction combines tubular fiberglass with composite core. Perfectly balanced, laser-straight, won't warp or split ever. 1- or 2-piece models, from inexpensive to the ultimate. Q-Pak with fleece-lined zipper case. Send for free info. **ST. CROIX** of Park Falls, Ltd., Park Falls, WI 54552

HUNTING, GUNS, DECOYS

DUCK HUNTER Easy to build sunken plywood duck blinds. Illustrated plans $7.50. Cajun Products, 908 W. St. Mary, Abbeville, LA 70510

ENGINES, MOTORS, MAGNETS

ENGINES to 19 h.p. for Mowers, Tillers, Hobby parts. Repair Manuals, Tremendous Savings, Fast, Dependable. Illustrated Price Booklet $1.00. Ashland Small Engines, Ashland, MO 65010

SPEED UP or **SLOW DOWN** any AC type motor up to 1/8 HP, RPM to 8000. Variable frequency 15 to 300 Hertz. **$132.00** includes shipping. Mark Electronics, Inc., Box 998, Nokomis, FL 33555.

REPAIR ELECTRIC MOTORS! ILLUSTRATED INSTRUCTIONS! Modequip, Box 7266, Kansas City, Missouri 64113

TOOLS FOR SALE

REFINISH all metals. Find-The-Proper Tools, Buffs, Compounds, Buffing Motors. Catalog $1.00. Eastwood, 720 Lancaster, Box 524M, Berwyn, Pennsylvania 19312

DISCOUNT TOOL Catalogue - $1.00. Hoosier Distributing, 3009 Sample, South Bend, Indiana 46619

7 TOOLS IN ONE Hammer, pliers screwdriver. Unlimited uses home, car, boat, camper. **SATISFACTION GUARANTEED** $8.36 includes postage. **SIMEON ENTERPRISES,** 1130 Randall, Eugene, OR 97401

UNIQUE NEW RATCHETING FLEXIBLE SHAFT SCREWDRIVER Works around corners, etc. Changeable tips. Details—Send stamped envelope. Screwdriver, Box 4901, Lafayette, IN 47903

CLAW JAWS Removes everything, Nuts, Bolts, Screws, Nails. Fast!! Write Xtricator, Mineral Point, Wis. 53565

UPHOLSTERY SEWING MACHINES

UPHOLSTERY Sewing Machines with Walking Feet, complete ready to use—only $459.00. Thompson Model PW103-AGBP **AVAILABLE FROM YOUR LOCAL DEALER,** or order direct (Master Charge-Visa) Datho Mfg., Inc. P.O. Box 12110, Lubbock, Texas 79452—Phone (806) 744-6774

MACHINERY, TOOLS & SUPPLIES

SAW chains for chain saws. Send $1.00, deductible from first order, for lowest prices. Espy, 8484 County Line Road, Brookville, Ohio 45309

4" METAL Cutting Lathe $80.90. Taig, 15048 Proctor, Industry, CA 91748

FREE Industrial Buyers catalog for home craftsmen. Buy equipment at some **LOW** prices as large industrial plants. Turnkey, 36PL, Letchworth St, Buffalo, NY 14213

BANDSAW BLADES, Carbide Tipped Saws, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

1400 Catalogs Listed and Described. Sources for Everything Imaginable. $4.00. Masterlog, Box 879-B, Fairfax, CA 94930

STEEL, Aluminum, Brass — Sheet — Bar — Tube. Shop Supplies, Plans. Write CEI, Box 152A, Knoxville, IL 61448

SMALL FOUNDRY Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

MULTIPURPOSE Tool, Build from Scratch & Parts. Lathe, Jointer, Shaper, Band Saw Sander and Many More Options. Saves Thousands, Works Great. Complete Plans & Specs $10.00. InoGlass, Ellsworth, NE 69340

LATHES —Unimat— Maximat — Sherline Enco. Catalog $1.00. Shop Supplies $1.00. Campbell, 2100D Selma Road, Springfield, OH 45505. (513) 322-8562

FIRING CIVIL WAR Model **CANNON** Plans. Catalog free. Graan—PM-102, Box 892, Shalimar, Fla. 32579

LOW COST DIGITAL READOUT MEASURING SYSTEM for milling machines with .100 & .200 dails. **SHOP TESTED PLANS** $9.95. **SHOPTRONICS,** Box 465, Veradale, WA. 99037

WRENCH CADDY. Mechanics timesaver. Newest wrench organizer. Free information. WHF, 5017 Karl Rd., Columbus, Ohio 43229

WOODCARVERS Supply 96 page catalog-$1.00; with hardback "Cabinetmaking" book worth $5.95 - both $3.00. 3056 Excelsior Blvd., Minneapolis, MN. 55416.

CROSSCUT SAWS And People-Powered Tools. Crosscut Saw Company, Two Leland Place, Seneca Falls, New York 13148

LATHE Top Wood Turning Duplicators. Literature, P.O. Box 8315, Tampa, FL 33674-8315

METAL BENDING MACHINE 1/4" Steel capacity 24" width, Build for under $100, Blueprints $8.00. McCune Technology, P.O. Box 53834, Fayetteville, NC 28305

USED Caterpillar Equipment Bought and Sold to Individuals at Reasonable Prices. Cat 600 Baker, Portageville, MO 63873

BUFFING & POLISHING

REFINISH all metals. Find-The-Proper Tools, Buffs, Compounds, Buffing Motors. Catalog $1.00. Eastwood, 720 Lancaster, Box 524M, Berwyn, Pennsylvania 19312

BLACKSMITH SUPPLIES

FORGES: gas, coal — hammers — tongs — anvils — anvil benches—all blacksmith supplies. Catalog $2.00 (refunded first order). Mankal Blacksmith Shop, 7836 Cannonsburg, Cannonsburg, MI 49317.

WELDING, SOLDERING, PLATING

WELDING AND SAFETY: Everything to fit the Welders needs - major brands, at discount prices. Catalog $1.00. City Welders Supply, 321 E. Highway 20, Michigan City, IN 46360

ENERGY SAVING

SAVE ENERGY and save money. Buy direct! Send for catalog of **HOME ENERGY SAVING PRODUCTS.** $1.00. Fuel Boss Sales, Box 129, PM10, Jericho, NY 11753.

TRIPLFILM WINDOW INSULATION. Clear, Low Cost 3 Layer Plastic in 1 easy-To-Use Piece. Send for Brochure. Preston Designs, 762 Gibbs, Ithaca, MI 48847

SAVONIUS Windturbine System Generates 2Kw Electricity! Simple, Economical Construction! Complete Plans $6.95. Glenvale, Box 358a Station O, Toronto, Ontario M6P 3J9

FREE Energy! Controversial Survival Publications, Three Dozen—Electricity, Gas, Gasoline, Guns, etc. Catalog $1. Consumertronics, Drawer 537, Alamogordo, NM 88310

FREE ENERGY SAVING/HOME PRODUCTS CATALOG from Justin Home Products, Box 938, Westbury, New York 11590. Free gift with first order.

SAVE $$$$$$! CONSERVE ENERGY! "Life Saver" extends light bulb life. Reduces electricity consumption. Free details. SASE. Ansta, Two North State, Springfield, PA 19064

WOODCHIP home heating. Write if you heat with chips or would like to. Bares Foundation, (Non-profit). P.O. Box 400, Chagrin Falls, Ohio 44022

SOLAR & ALTERNATE ENERGY

SOLAR AND ENERGY SAVING PRODUCTS CATALOG! MATERIALS; Components; Complete System. 80 Pages, 18 Sections. Our 10th year! Order from one expert source—the country's largest energy saving mail order house! Call us at 603-668-8186 or send $1.00 ppd. **SOLAR COMPONENTS CORPORATION,** Dept. M, P.O. Box 237, Manchester, NH 03105

FREE HEAT . . . . Cooling! Passively Solarize—Easily! . . . . Sample Information. "Solarsited," 481 Eighth Avenue, New York City, 10001

HYDROGEN FUEL! Complete Electrolyzer and Auto Conversion Plans. Plus information on Safe Storage and Generating Hydrogen. Free. Complete Package: $10.00. RDA, Box 873, Concord, NC 28025

SOLAR COLLECTOR Heats Air Fast for Savings, Inexpensive, Easy to Build. Complete Plans $8.00. Bright Co., PM10, RD 2, Box 132, Elverson, PA 19520

HEAT Water with wood. Save $$$$. Send $7.95 - Plans. Woodwater, General Delivery, Hardwood, Michigan 49844

SOLARIZE Any Home-New Guide Details Many Ways . . . Free Information! EW&S, Box 72M, Leatsdale, PA 15056

WHY SOLAR DOESN'T WORK? The True Story By Famous Solar Designer. $6.00. Godby Solar, 821 Cortez, Denver, CO 80221

ALCOHOL! 180 PROOF! Make Cheap Fuel Booze With Simple Still. Information Free! Desert-PM, Box 8233H/B, Kingman, AZ 86412.

ELECTRICITY From The Sun— "How-to" pocket, including Sample Solar Cell, schematics and economics, $9.95. Sunelco Corporation, 11125 Flintkote, Suite E, San Diego, California 92121.

HOME HEATING, FUEL SAVERS

CONVERT fireplaces into efficient, airtight heaters. Save hundreds. Complete plans $5.00. Wilhelm Ironworks, Box 1165, Springerville, AZ 65938

LOG SPLITTER Plans, Build Yourself, Hydraulic Power, No Gimmicks, Satisfaction Guaranteed $10.00 M Franssen, P.O Box 483, San Lorenzo, CA 94580-0483

BURNEO SY ENERGY COSTS? BUILD your own Wood Burning Furnace from your salvaged materials. Will heat home, garage or shop. Information $1 00. complete drawings and instructions $10.00. SNS Associates, Box 126, Rives Junction, MI 49277.

100 Safety And Efficiency Facts For Kerosene And Wood Burning Heaters $2.00. Facts, 26291 Bryan, Roseville, Michigan 48066

SAVE HUNDREDS ON HEAT This Winter Without Wood, Solar Or Other Large Investments. Free Details. Ensave-M, Box 743, Marlboro, MA 01752

150 Ways to Save Money, Energy in the Home and Car. Send $3.00. H. Eshkibok, 55 South Eden, Sault Ste Marie, Ontario, Canada P6C 5N4

SAVE to 40% Heating - Cooling. Stamped envelope. William Morris, Box 392A, Dana Point, CA 92629.

REUSABLE FURNACE FILTERS Patented design, easy to clean, Send size requirements, $9.95 ppd. Lindner Products Company, 2663 Elmridge N.W., Grand Rapids, MI 49504

WOODBURNING stove 6" from the wall? We did! In a mobile home! Detailed plans $10. Wallsaver, Rt 1, Box 335, Bartlesville, OK 74003

HOME CRAFTSMAN

LARGE selection of plans. Furniture designs, loom, spinning wheel, clocks, dollhouses, cradles, toys, alphabets, bird houses, weathervanes, kites and more. Catalog 50¢. Craftplans Co., Rogers, Minnesota 55374

MAKE WOODEN Toys Plans- Hardwood Wheels, Parts, Dowels- Catalog $1.00. Cherry Tree Toys, Belmont, Ohio 43716

PLANS For Sell Sufficient People. List Free. Kitt, Box 907, Palisade, Colorado 81526

OVER 75 PATTERNS! Enjoy making profitable wooden gifts, toys, household accessories. **PLUS** "Shop Secrets". Only $5 00 Accents (P-102), Box 262, Danvers, MA 01923

CATALOG FULL-SIZE FURNITURE PLANS — $2.00. Refunded with first order. Traditional, Early American, over 170! Furniture Designs, 1425 Sherman, Dept. CP-82, Evanston, Illinois 60201.

PLANS & Supplies for toys, clocks, furniture and accessories. Catalog $1.00. Armor Products, Box 290, Dept. CT, Deer Park, NY 11729

BUILD IT YOURSELF - Toys, Puzzles, Planters, Furniture, Bird Houses, Rocking Horses, Toy Cars & Trucks 32 page catalog of "same size" Patterns, Wheels, Books. $1.00. Design Group, Box 514Q, Miller Place, NY 11764.

UNFINISHED picture frame moulding. Factory closeout. 50% discount. 200 styles. Write: Japs, 126-PF Seventh North, Hopkins, MN 55343

WOODEN Toys Are Better. List Of Plans $1.00 U.S. Currency Only. Woodbutchers Toys, Box 514, Leslie, Mich. 49251

NATIVITY SCENE $5.00, SANTA & REINDEER $4.00. Full size jigsaw patterns, color coded for distinctive outdoor or indoor display. Easy to make. Send prepaid to. MC Patterns, P.O. Box 319, Park Ridge, Ill. 60068

PATTERNS for copper candle holders and artifacts, Catalogue $1 00. Copper Crafts, P.O. Box 664, Medina, Ohio 44258-0864

THREE Unique Wooden Car, Truck, Sailboat or Spaceship plans $2 00. "Plantasy", Box 2392, Kalamazoo, MI 49001

VALUABLE Information on Drilling Metal $3.00. Joseph Belton, P.O. Box 446, Ridgeway, S.C 29130

DUCK DECOYS from scrap wood Four sizes Easy Plans $3 00 Pinecraft, Box 352, Carthage, MO 64836

ZEBRA WOOD 1½" × 1½" × 15", $18.95 Foxcrafs, 31 Fox Road, Edison, NJ 08817

POPULAR DEMAND, Space Shuttle Columbia, layed out pattern on hardwood Maple $14 95 or on paper $2.50, instructions included Andersen's Traditional Wooden Toy Designs, P.O Box 2637, Bryan, Tx. 77801.

HOT TUB How To construct Fast! For under **$900.** Send $1.00 Brochure. Aztech Design, Box 2069PM, Des Moines, Iowa 50310

WOODWORKERS, 6 Bandsaw Patterns. High Profit, Big Demand. Sell Wholesale or Retail Production and Marketing Tips. $5.00, Legal SASE. Ozark Images, POB 502, Gainesville, MO. 65655.

WORKBENCH- Sturdy built-in for garage, basement 20 sq ft work area, 40 cu ft. storage Easy to build Plan #101-P. $3 98. McWilco, Box 566, Mars, PA 16046

UPHOLSTERY catalog 10 easy furniture plans to build from. Sofas, rockers, ottomans, etc $1 50 cash/M O. Refundable. Elementary Furniture, P.O Box 395, Lacombe, Alberta T0C 1S0.

FREE CATALOG: Furniture Plans, Multi-size, Full Scale. Flexiplan-X, 48 Lowell, Westwood, NJ 07675

WOODWORKER HUGE PROFITS, EASY ENJOYABLE WORK MAKING OVAL AND OTHER HARD TO FIND FRAMES. FREE DETAILS WRITE: THE WOOD BHED, 13366 SHARP ROAD, SIDNEY, OHIO 45365

BLUEPRINT & PHOTO WOOD TOY PLAN BOOKS
BOOK 1, semi-trucks, trailers, & dump truck **BOOK 2** pick-up truck, tow truck, & take-apart car Send $7 95 for each book requested to: The Jacobsen Co, Box 35113, Edina, MN 55435

MAKE COUNTRY PINE mirrors, shelves, home accessories and toys Full-scale patterns with step-by-step directions . . . Catalog and **FREE** mirror pattern, $1 25 . . . Country Craftsman, Box 67- PM8, Dauphin, PA 17018

NEW- $500.00 From one sheet of Plywood. Guaranteed. Oakstump Woodcraft, 3630-P10 Pacific Way, Longview, Wash. 98632

SUPER SAW! Scroll saw does amazingly intricate work! Save-assemble it yourself Twice the performance at half the price Full information package $5 00 Money back Guarantee. CEI, Box 152B, Knoxville, IL 61446

ROCKING HORSE Full size, easy to build plans. $4 95. Carver Crafs, 412 S Cummings, Glassboro, NJ 08028.

CLASSIC TOY PLANS, fun or profit. Inexpensive, easy to make. Catalog $1 00. Plans, Box 3385, Stony Creek, CT 06405

OCCASIONAL CHAIRS 2 BEAUTIFUL Chairs from 4×8 Plywood. Comfortable and functional. Easy construction. Plans $3 00 **XINETIC I,** 7115 Blanco Rd., Suite 114-146, San Antonio, Texas 78216

SUILO COLONIAL REPRODUCTIONS for profit!! Free details! Domenig, Box 1101PM, Thomasville, N.C. 27360

NEW - STEREO CABINET - Plans $5 00 Advanced Designs, P.O. Box 605, Dunn, N.C. 28334

CONSTRUCTION PLANS, BLUEPRINTS

SHELVING Commercial-Household. Simple, sturdy, low cost wood modules Unique Plans $12.95. Consultecs, P O. Box 331, Caruthersville, MO 63830

HOME BUILDING & REMODELING

KITCHEN Planning Guide. 23 years experience. $5 00. Telco. 12404 Technology, Austin, Texas 78759

CARPENTERS-ALMOST UNEMPLOYED? Get back in the money, help others back to the land Financing, Free Information. Sharp, R 2, Box 15, Peculiar, MO 64076

SOLID OAK MAPLE or **WALNUT SWITCHPLATES** and accessories beautifully handcrafted, ready to finish, or finished Free brochure. LTB, Box 344043, Farmers Branch, TX 75234

OWN YOUR HOME Save 50%, Free Information. Consumer Associates, Box 13257-AW, Pittsburgh, Pennsylvania 15243

PLASTICS

CASTOLITE Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing; in industry, laboratories, craft work. Reproduce your designs with our mold materials Profitable Illustrated Catalog $1 00 **CASTOLITE,** Dept. 82M PM, Box 391, Woodstock, IL 60098

RIDICULOUS CATALOG, Engraved Items $3 95, Refunded. **CORKY'S,** 5221 SE 25TH Ave., Ocala, Florida 32671

DO-IT-YOURSELF

7' TELEVISION projector plans Details Buono, 85 Colonial West, Tonawanda, N.Y. 14150

SUILO your own metal scale using odds & ends around your shop Uncannily accurate! Complete plans ($2 00) from. Lynnscott s, 239 Birchwood, Soo, Ontario, Canada P6A 6K1

WELDERS - mechanics save $ Build folding Jackstands, Hydraulic Press etc. Information $1.00. Bigdee Plans, Box 9250, Long Beach, CA 90810

WATERBEDS! Plan And Accessory Catalogue $1 00. Waterbeds, 1210A "Z" Street, Vancouver, Washington 98661

SAVE steps, money. Use your telephones as an intercom Plans $5 00. dB Enterprises, Box 453A, Westwood, NJ 07675

ELECTROPLATING. Complete amateur's textbooks All metals Electroplate metallic/nonmetallic items $11.95 Details free Tropic, Box 95-P3, Palm Bay, Florida 32905

1400 Catalogs Listed and Described Sources for Everything Imaginable $4 00 Masterlog, Box 879-F, Fairfax, CA 94930.

SUILD THE BEST WORKBENCH for the least money. Complete workshop not necessary Plans $4 00 Benchco, P.O. Box 631, Peterborough, NH 03458

SAVE on parts for Lawnmowers, Minibikes, Karts, Chainsaws, Small Engines **THOUSANDS OF PARTS.** Send $3 00 For Catalog Sav-On-Parts, P.O Box 231, Somerville, Mass 02143

WATERBEDS! Build Yourself Brochure $2 00, Plans $5.00 Waterbeds, 4901 Aurora, Ventura, CA 93003

PROJECTION TV . . . Convert your TV to project 7 Foot picture . . . Results equals to $2,500 projector . . . Total cost less than $20.00 . . **PLANS & LENS** $16 00 Illustrated Information **FREE** . . . **MACROCOMBB,** Washington Crossing, Pennsylvania 18977. Creditcard Orders 24 HRS. 1-215-736-3979

SAUSAGE KING How To Make Ten Types, Instructions Eight Spices, Fifty Feet Casing, $9.50. 44 Miller Crest Lane, St. Paul, Minn 55106

SAWMILL, Automatic, Quiet, Portable, Build for $2 00. Write. M-B, RR2, Louisiana, MO 63353

CLOCK CLEANING, Most **PENDULUM** Type Yourself in 10 Minutes Grandfather, Mantle, Cuckoo Save $40.00—$100.00 Send $7 00, Self Addressed Stamped Envelope. L and L Clocks, Box 87P, Ringwood, IL 60072

POOL TABLE OWNERS: WE HAVE Supplies, Accessories, Parts. Free Catalogue Recovery Instructions $3.00. Babe's Billards Inc., Box 1406, Ft. Pierce, FL 33454-1406

"COMBINATION Chair Cushion, Lap Seat, Napper for Baby Simple, Beautiful Instructions Photos, $5.00 A sewing great." David Reitsnider, 1197 Waughtown St., Winston-Salem, NC 27107

1600 CATALOGS on every subject imaginable!!! Each Categorized . . . Alphabetised . . . Described. Send $4 00, Catalogs Galore, 7914-A Springfield Village Drive, Springfield, VA 22152.

MAKE POWER PLANT -for under $150.00 Send $4.00 To: Plans, Box 443, Dewey, AZ 86327

SOLAR SKYLITE At Last! A handsome redwood skylite you build yourself Instruction Booklet only $10.00. Catalogue — $1.00 Wasatch Solar Engineering, 1164 North Street, Dept.-A, Ogden, UT 84404

KNIFEMAKING SUPPLIES and **KITS** Catalog $1.00 Jack Wolfe's Knife Works, Box 1056PM, Larkspur, California 94939

SAVE HUNDREDS YEARLY! Do-it-Yourself Washer, Dryer, Dishwasher Repair Manuals. Details Free! Kings, Dept. PML, 406 West Camino Real, Arcadia, CA. 91006

MAKE CHARCOAL -Convert 55 gallon drum into reusable kiln, easy to make, inexpensive and fun. Send SASE and $5.00 for **NEWTON'S METHOD** to: J. J. Newton, 1497P Scandia Road, Warren, PA. 18365

UNIQUE design **BUTCHER BLOCK CART,** easy construction, build for under $50.00. Plans $3.00. Piller Enterprises, Box 4944, Austin, TX 76765.

SIMPLE Adjustable stool in a box, 9 sitting positions 6" to 32". Detailed Plans Hockema Products, 1200 Ridgeway, Lafayette, Ind 47904

DON'T DIE! Without a will. Complete **WILL KIT.** Two will forms, asset sheet and 64- page booklet. $4.00 postpaid. **ORDER NOW!** Tahoe Enterprises, 183 Jackson, Bradford, PA., 16701

DULL DRILLS? Instructions, Diagrams for **EASY** Sharpening $5 00. Drillco, Box 2, Woodstown, N.J. 08098

ARTS & CRAFTS

PLASTERCRAFT, CANDLECRAFT, RUBBER MOLDING for Fun - Profit! Make Figurines from Complete Kits! Catalog $1 00 (Refundable). Wooley Company, Box 68PM, Peoria, Illinois 60601 Established 1917.

"GETTING Started in Stained Glass" $1.00. Whittemore, Box 2065T, Hanover, Mass. 02339

SNAPS and Hardware for Leathercraft. Free Catalog. Campau Co., Box 35761P, Dallas, Texas 75235.

DOLLHOUSES miniatures catalog $2 00 refundable. Christmas Shop, Box 704P, Calabash, North Carolina 28459

CRAFT Jewelry Supplies (Wholesale Catalog .25¢). Roussels, 107-1630 Dow, Arlington, MA 02174

STAINED GLASS SUPPLIES Complete Catalog $1 50 (refundable). Sunshine Glassworks, 785 Millersport, Dept. CT, Amherst, NY 14226

SOLDIER MOLDS, FREE Brochures, With Soldier $2 00. Coastal, Box 44-PM, Cedar Grove, N J. 07009

HANDICRAFT Catalog - featuring over 2000 molds and supplies for Plaster, Resin and Candlewax - plus much more! Send $2 00 (refundable): Specialty Products, Dept. 7-B, 731 Brooks Road, Muskegon, Mich. 49442

COMPLETE HANDBOOK of **POWER** and **HAND TOOL WOODCARVING.** Huge $11 45. **"SPIKE" BOYD,** Route 1, Box 416, Highlandville, MO 65669

STAINED GLASS Catalogue-P. $1.00. Supplies, Kits, Books, Tools, Glass. Saylescrafts, 171 Main, Nyack, N.Y. 10960

BEGINNERS Stained Glass Program, $1.00, Brochure SGG, Box 777PM, Marshalltown, Iowa 50158

CARTOONING, COMMERCIAL ARTS & SIGN PAINTING

MODERN Cartooning taught by mail Write for free brochure. Cartoonerama—Box 263-3J, Branford, Conn. 06405.

SIGN Painting — Easy method Free catalogue Kaufmann Company, Centertown, Missouri 65023

(Continued on next page)

CARTOONING, COMMERCIAL ARTS & SIGN PAINTING

(Continued from preceding page)

CARTOON for Fun and Money!!! Free booklet!!! Cartoons, Box 40614A, Detroit, Michigan 48240

35 LESSON cartooning course Cartoonist's Magazine, both $4.00. Hartman, Box 30367, Lincoln, Nebraska 68503-0367

LEARN Sign Painting Brush Included Eureka Press, Box 931-PM, Fitzgerald, GA 31750

CARTOONING! CARICATURING! PROFESSIONAL'S. SEVEN Illustrated **INSTRUCTION BOOKS,** $3.00. Kingsley Harris, P.O. Box 1587, Portland, Oregon 97207

MODELS-CARS, SHIPS, TRAINS, PLANES ETC.

MODEL AIRPLANES — Huge Catalog $2.00 Sig Manufacturing Co., Inc., Montezuma, IA 50171

RADIO CONTROL - Airplanes, Boats, Helicopters, Systems, Supplies Big Discount Catalog-$4.00 (Refundable) Modelers Supply, Box 7185, Montgomery, AL 36107

WANTED Old Toy Trains Lionel American Flyer, Etc T&S, Box 1668, Hawthorne, CA 90250-1668

LIVE Steam Engine Kits. Marine, Stationary, Walking Beam, Boilers, Fittings HPK's Fascinating Models Catalog $3.00. Cantuck 34, Yonkers "K", New York 10710

MODEL Ship "The Cutty Sark" Wood Hull, Cloth Sail, Metal Fittings, Brass Pins, Chain & Name Plate Instructions. $19.95. Satisfaction Guarenteed, Berry Bern Gifts, Box 324 Fairview Lane, Strawberry Plains, Tenn. 37871

TOYS, GAMES, PUZZLES, NOVELTIES

WAR GAMING -Learn How-Guide $4.98- White Heron Enterprises, Box 2178M, Virginia Beach, VA. 23450

EXCITING GAME PLAYED IN FORESTS $3.00; Edmund Pizon, RD 1, Richland, NY 13144

MAGIC TRICKS, JOKES, VENTRILOQUISM

FREE! World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, C-6013, Mt. Clemens, MI 48043

PROFESSIONAL Magic! Huge catalog, over 1,000 tricks and books $2.50 Hank Lee's Magic Factory, Dept. PM10, 24 Lincoln Street, Boston, Massachusetts 02111

FREE! Illustrated Ventriloquism Puppetry Catalog Maher, Box 420PM, Littleton, Colorado 80160

"MAGIC Explained", Monthly Newsletter, Sample $1.00 Box 426, Phoenix, Oregon 97535

HOBBIES AND COLLECTIONS

MILITARY Medals Catalogue 50¢ Yearly Subscription $4.50 Vernon, Box 387PM, Baldwin, NY 11510.

"OLD Time Soldier Molds," Chess Set Figures Write for Free Information and Special Offering. Castings-PM, P.O. Box 3482, Longwood, Florida 32750

7 PETRIFIED Ancient **SHARK TEETH** $2.00 Guaranteed. Piproductions, Box 6453, Clearwater, FL 33518

DECALS, EMBLEMS, PATCHES

PATCHES, Decals, Custom Made Free Catalog - Emblems, Box 35, Tappan, New York 10983

SAVE Big Buy Patches, Decals, Pins & Caps Factory Direct. Free Catalog. Free Pricing Eastern Emblem Co., Box 828-PM, Union City, N.J. 07087

EMBROIDERED EMBLEMS - your design. Low minimum. Free brochure with prices. Southern Emblem, Box 8P, Toast, NC 27049

$1 BRINGS You List America's Most Popular Bumper Stickers. Mail to: **AMPUR,** Box 61, Lombard, IL 60148

ANTIQUES, RELICS, INDIAN GOODS AND CURIOS

FREE List to Serious Collectors. 30,000 Indian Artifacts, Pots, Spears, Axes, Slate, Beadwork Caddo Trading, Box 869, Murfreesboro, AR 71958

ORIGINAL Antique Telephone and Parts Catalog $1.00. 18 Different Styles Telephone Company, Turtle Lake, WI 54889

STAMP COLLECTING

U.S. 25 Different mint Including Souvenir Sheet $1.00. Free list. Brooks, Box 82, Brooklyn, NY 11229

50 YEARS Old fifteen different United States, over fifty years old—25¢ with approvals. Jaxon, Box C11-P, New Rochelle, New York 10604

WOW! 50 All Different Germany-10¢! Super collection of genuine German Commemoratives, Definitives, Airmails, High Values. Free Big Catalog Also fine stamps from our approval service. Buy what you like Return balance promptly. Send 10¢ today! Thank you. Jamestown Stamp Co., Dept A102PM, Jamestown, NY 14701

1,000 DIFFERENT WORLD + 100 DIFFERENT MONGOLIAN BEAUTIES $3.95. ATTRACTIVE APPROVALS (PICTORIALS). CANCEL SERVICE ANYTIME. ADULTS ONLY. GOUGE, BOX 1320-MI, ELIZABETHTON, TENNESSEE 37643.

TOPS! 100 Popular Poland Stamps (all different) only 25¢. Mystic, Dept PS1, Camden, New York 13316

FOUR US PLATE BLOCKS over twenty years old. One dollar to approval applicants only Littleflower, RR1, Box 118B, Osceola, WI 54020

OLD U.S. BARGAIN STAMPS! Uncommon approvals for adults Valuable used stamps with various imperfections. (No mint, no packet material) Rivertown, Dept. 152P, Ada, Michigan 49301

FREE! Big Bargain Catalog - New Edition listing thousands of bargains including U.S. & B.N.A. stamps, packets, albums, accessories and supplies Also fine stamps from our approval service. Buy only what you like Return balance promptly. Thank you. Jamestown Stamp Co., Dept. E102PM, Jamestown, NY 14701

PENNY APPROVALS all fantastic values **DATASTAMPS,** Box 5552, Jacksonville, FL 32207

U. S. 30 mint commemoratives $1.00! Approvals Gordon Davison 307C, Contoocook, New Hampshire 03229

U.S. COMMEMORATIVES honor **JACKIE ROBINSON** and 1980 **OLYMPIC GAMES.** 2 first day covers on lovely cacheted envelopes $1.50 **K.M. WALSH,** Box 308M, Tuckahoe, NY 10707

FREE Gift With Quality Approvals Chapmans, Box 487-G, Galesburg, Michigan 49053

GREAT Gift free with 1st purchase—fine United States approvals and want list service Send 15¢ for handling The Stamp Boutique, P.O. Box 458, Madison, NJ 07940

FREE Wholesale Singles and Plate Block Price Lists Six .4¢ Plate Blocks $1.00 AMPBCO, Box 26066P, St. Louis, MO 63136

BREATHTAKING Beautiful 50 Different mint Monaco pictorials commemoratives only $1.50 with mint complete set approvals Pagoda, Box 132P, Sidney, Ohio 45365

PENNY! Approvals! Regardless catalogue! Kloster, 4164 52nd St., San Diego, Calif. 92105

UNITED NATIONS 3 Complete Mint Sets 25¢, Approvals. Cornetta, POB 1509-M, Lake Placid, Florida, 33852

50 DIFFERENT Old U.S. between 1861 and 1939 - $1.00 Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

OLD U.S. Stamps on Approval Chester, Box 15355G, Philadelphia, PA 19111.

WORLD Wide Stamps mounted in books on approval 2¢ and up. **TRUST STAMP COMPANY,** P.O. Box 100-P, Jamaica, N.Y. 11435

FREE Surprise collection sent with approvals Gould, 1764 Union, San Francisco, 94123.

FREE 220 United States and Worldwide Stamps Approvals Stamps PM, Box 1427, Bellflower, CA 90706

100 Different U.S. 25¢, Approvals. Bradley, Box 425P, Midlothian, VA 23113

BARGAIN 100 World-wide Stamps 25¢ Quality Approvals R. Parker, Box 143, West Brookfield, MA 01585

2,000,000 Stamps—150 Countries—2¢ Each Belden, Box 4149, Dearborn, 48126

STUNNING! 100 BEAUTIFUL MINT PICTORIALS. All Different Only 25 Cents with Attractive Worldwide Approvals. **VANSTAM,** Dept. PM-1082, P.O. Box 11272, Chicago, Illinois 60611

RUSSIA— 50 Different Including Many "Oldies", Just 10¢. Approvals. Tarheel Philatelics, Siler City, North Carolina 27344

"INVERTED ERROR" + 100 Different United States, 50¢ with approvals Luray, P.O. Box 7088, Silver Spring, MD 20907

60 TOPICALS 25¢ when requesting low priced approvals. Stewart Kent, Box 2398X, Bellingham, WA 98227

PENNY Approvals 1 - 2 - 3¢ CK Stamps, 17902 Marklee Drive, Jamul, CA 92035

FREE 100 Canada with request of World Wide Approvals. Briner's, P.O. Box 5607, San Mateo, Calif 94402

50 LATIN AMERICA -25¢- Approvals. Crockett Stamp Company, P.O. Box 1449, Crockett, Texas 75835

ISRAEL 15 Different 10¢ Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33444

LOOK! 351 World Stamps $1.00. Worldwide Approvals. Klondike, Harrisburg, Ill. 62946

SENSATIONAL! 100 Worldwide-25¢ Approvals. AGZ, PM1, 679 North Spruce, Rialto, CA 92376

POSTAGE Stamp Exchange, Advertiser Sample 25¢ Box 426, Phoenix, Oregon 97535

ABSOLUTELY FREE- 50 different British Colonies **COMMEMORATIVES.** Approvals. Gobestamps, Box 690, Saco, ME 04072

"WHOLESALE" U.S.—Foreign Pricelist and catalog Free! Everything Guaranteed. Schneider, Box 1240, Grand Rapids, Michigan 49501

FREE U.S. Mint Set Approvals Hildebrand, Box 4867, Santa Clara, California 95054

100 Different Worldwide Stamps 30¢ With Approvals. R.G. Sales, Box 1065, Jamaica, N.Y. 11431

45 DIFFERENT U.S. AIRMAILS $2.00; Mint $15.00. Eberling, Box 2216, Neptune City, NJ 07753

HINGELESS ALBUMS Of Tomorrow Send $1.00 for Sample and Catalog. SAFE Publications, Box 263, Southampton, PA 16966

INTRODUCING - 225 DIFFERENT WORLDWIDE - NOW 25¢! Includes special selection of colorful stamps picturing animals, sports, flowers, paintings, space and much more. Other exciting stamps enclosed for sale on approval - Buy some or none, return balance - Cancel service anytime. World Stamps, Dept. PM1082, 6052 Judwick Circle, Huntington Beach, CA 92648

25% Off Scott. General Approvals Premiums and other Offers Karkins, 1419 W. Summerdale Ave., Chicago, IL 60640

COMPLETE mint US year set of 1945 - $1.00 when requesting World Wide approvals Benat, P.O. Box 210244, Dallas, Texas 75211

½¢ EACH! Beautiful foreign approvals. **JADACO,** Box 656PB, Tuscarawas, Ohio 44682

100 Worldwide stamps 10¢ Approvals. Lynwood, A-12, Box 11094, Nepean, Ontario K2H 7T8

FREE The 1969 US Man on the Moon Jumbo Space Airmail Stamp is yours Free with your request for our U.S., U.N., and Worldwide Approvals. Colonial, Box 12113, Albany, NY 12212

50 U.S. Commemoratives $1.00 Approvals Happy, Box 124, Springvale, Maine 04083

150 DIFFERENT Colorful worldwide stamps plus approvals. Send 50¢. Bison Stamps, 818 Gist, Silver Spring, MD 20910

FREE! Worldwide stamp mixture. Approvals White, Box 24166A, Indianapolis, Indiana 46224

200 Fascinating Worldwide Plus Valuable Surprise - 25¢ Attractive Approvals Included. RCP, Dept. PM1082, Box 19518, Indianapolis, IN 46219

COINS, TOKENS, CURRENCY

FIVE Different Mint Error Coins $2.00 Coin Lists Free Sayers, 1000 Unaka, Johnson City, Tennessee 37601

FREE: Worldwide Listing of Beautiful Collectors Currency. Tom Knebl, P.O.D. 3949, San Bernardino, Calif 92413

STOP! CASH from Coins **FREE DETAILS.** Trade Secrets. Hurry! Tibenua Press PM10E, 6062 E. 56th Pl., Tulsa, Okla 74135

CAMERAS & EQUIPMENT

BARGAIN BOOK Send .25¢ credited on $5.00 order **CENTRAL CAMERA CO.** Dept # 33102, 230 So. Wabash Ave., Chicago, IL 60604 **PHOTOGRAPHIC HEADQUARTERS SINCE 1899** (312) 427-5580

PHOTO & PHOTO SUPPLIES

SAVE $$$. Free Photographic Catalog - 35mm, Super 8, 16mm, Supplies. Superior, 442-505 Wells, Chicago, IL 60610

BOOKBINDING

BIND books - magazines with the Multi-Purpose Press & Plough for Hand Bookbinders. $1.00 brochure. P.M. Ballantine, 202 North Walnut, Yellow Springs, Ohio 45387.

BOOKS & PUBLICATIONS

PUBLISH Your Book! Join our successful authors Publicity, advertising, beautiful books. All subjects invited. Send for fact-filled booklet and free manuscript report. Carlton Press, Dept PMJ, 84 Fifth Avenue, New York 10011.

BEST Collection Of Self Help Paperbacks Modestly Priced. Order **EXCEPTIONAL MEMORY** only $3.75 Before March 1983 or Free Circular Covering Over 300 Books. **KRISTEN** Old Redford, P.O. Box 19008, Detroit, MI 48219

"SURVIVALIST'S Book Catalog" Rush $1.00. Ken Hale, (202), McDonald, OH 44437-0395

PUBLISHER'S OVERSTOCKS, BARGAIN BOOKS. 2,000 Titles, all Subjects! Free Catalog Hamilton's, 98-51 Clapboard, Danbury, CT 06810

FREE Book Prophet Elijah Coming Before Christ Megiddo Mission, Dept 63, 481 Thurston Road, Rochester, N.Y. 14619

OUT-Of-Print Books Found. Send Wants. Booklook, 51 Maple Ave., Warwick, N.Y. 10990

FREE Illustrated Self-Improvement Book Catalog Write Cobb's, 17435 Imperial Valley, Suite 1810, Houston, TX 77060

FREE Large Selection of Self-Improvement Books La Nora Gifts, 2300 N. Woodward, Suite 1-515, Royal Oak, Mich 48073

WINNERS Are Happier, Healthier, Richer! Free, Illustrated Book & Casette Catalog Champion Publications, Box 253, Somerset, Mass 02726

(Continued on next page)

BOOKS & PUBLICATIONS

(Continued from preceding page)

400 + BOOKLETS. All Interests. List $1.00. Carol Wilkinson, Box 894, Westminster, CA 92683

MONEY Making books/formulas, self-improvement books! Hundreds!! Catalog-$2 00 (refundable), Mountain Enterprises, Box 1207, Bonners Farry, Idaho 83805.

FREE GOVERNMENT MONEY and loans for Business, Housing, Medicine, Education. Over 150 listings! $3 50 T. Michael Press, Box 3646, Azalaa Station, Wilmington, N.C. 28406

LITERATURE ON CASSETTE. Relax, Work, Drive Whila Listening. 1500 Titles: Books, Poetry, Children'a, More! Free Catalog Literature, Box 626M, Hadlock, WA 98339.

FREE list 400 self improvement books. Westport, 912 West Grand, Springfield, Missoun 65807

FREE brochurs 400 self improvement and how to books. Information Center, 228D South Fourth Street, Coplay, PA. 18037

NEW METRICS FOR MILLIONS Easy to use conversion tablea $4.95 postpaid K.T., P.O. Box 202, Station C, Kitchener, Ont. N2G 3Y9

SPEED Reading. Easiest Method. $4.00. Millium, 938 E. 5th, Ene, PA. 16507

LITERARY INTEREST

PUBLISHING with a "vanity" publisher? Wait! Wa placa books with "regular" publishers on a subsidy basia. Wordamith Agency, Dept. 1, Gamarvilla, N.Y. 10923

MUSIC INSTRUCTIONS & INSTRUMENTS

PLAY GUITAR In 7 Days, 66 Pega Proven Mathod, 100 Popular Songs, Chord Finder, Tuner, All For $4 98 Plus $2 00 Postage Guaranteed Ricochet House, 4829 W. Fairfield Dr., Pensacola, Florida 32506

POWERFUL New Keyboard Playing Couree Exciting Benefits ProMusic, Box 86B, Brookfield, CT 06804-0086.

POEMS Set To Music. Nashvilla Music Productions, Box 40001-PM, Nashvilla, Tennessee 37204.

PIANOS, PLAYERS, PUMP ORGANS. Rebuild and repair. Catalog of "How-To" books, $2 00 (refundable) Vestal Press, Vestal 11, New York 13850.

SUPER-SAVINGS Guitar Strings, Accessories, Effects Pedals, Microphones, atc Free Catalog Super-Sava Music, Box 944, Morganton, N.C. 28655

FREE Catalog! Kits and Completed Harpsichords, Hammered and Appalachian dulcimars, guitars, banjos, mandolins. Hughes Dulcimers, 4419 West Colfax, PM, Denver, Colo 80204.

ACCORDION Top Brands, Cordovox, Buy Direct. Tremendous Discounts. Trades accepted. Free brochurs PM, Accordion-O-Rama, 16 West 19th Street, New York, NY 10011

INTERNATIONAL Catalog valuable to makers, repairers of stringed instrumenta. Imported woods, parts, accessorias, kits Fina German-made violins, violas, cellos, basses and bows Send 25¢ for catalog. 10% Credit Cartificata will be anclosed. International Violin Company Ltd., Dept FJ, 4026 W Belvedera Ave., Baltimore, MD 21215.

BAGPIPES - $60 Up. Brochures $2. Mideast, 2817 Cameron, Melbourne, FL 32901

POCKETSIZED Flip Chart with 25 Illustrated Guitar Chorda. Sand $3 00 To: Jarry Holdan, 926 N Walnut, Apt. 1, Danville, Illinois 61832

FINGER-STYLE GUITAR: Made easy! **EXCITING NEW GUIDE MANUAL** teaches **EXCLUSIVE-** Play by Ear - Technique No music reading! Shows (step-by-step) **HOW TO** play melody, harmony, Rhythm, bass simultaneously. **PRICE: $12.00. BONUS:** Instructional song booklet included **FREE.— ACT NOW.** Or, sand $1.00 for information—refundable! **FINGER-STYLE GUITAR,** 453D-PM, Lahi, Utah 84043

READ MUSIC using revolutionary quick-study method! Simple, easy to follow inatruction book Guaranteed! Only $5 95 Layorhouse, 148 Wast 67th Street, Suita 821, New York, New York 10023

MUSICAL Instrumanta Hot Lina! Incredibla Prices Amps, PA Gear. All Instruments. Huge Selection. Sam Ash, Established 1924. 800-645-3518 NYS (212) 347-7757

LEARN PIANO-ORGAN almost instantly! Easiest method guarantees results! Free information. InstaMusic-PM, P.O. Box 30309, Phoenix, Arizona 85046

EDUCATION & INSTRUCTIONS

REPAIR Coleman And Other Outdoor Camping Equipment. Learn How In Your Spara Time Proven Homa Study Mathod Accredited School Send For Full Details Now! Modern Schoola Of America, 2538 N 5Th Street, Dept. PC, Phoenix, AZ 85006

DRAFTING is a graat career! Men, women. No previous experience or special talant needed Wa train you at homa in spara tima Gat Iree facts Write North American School of Drafting, Dept PBC82, 4500 Campus, Newport Beach, CA 92660

FREE CATALOG — LEARN AUCTIONEERING! Full and partial scholarships available. Nashville Auction School, 233 E. Gaines St., Box 190, Department 2, Lawrenceburg, TN 38464

BOOKKEEPING Or Accounting! Easy home-study plan preparas you quickly to do your own books . . or others Approved for Veterans. Free "Accounting Career Kit." Write Accounting School, Dept. PBC82, Newport Beach, CA 92660

"JET/GAS TURBINE CAREERS!" Homestudy courses — theory, maintenance, ovarhaul — Established 1957. **AMERICAN JET SCHOOL,** Department PM-3, Darby, Montana 59829. (406) 349-2100

SERVICE KEYBOARD INSTRUMENTS Piano Tuning - Electronic Organ Servicing **ACCREDITED NHSC** - Free Booklet **NILES BRYANT SCHOOL,** Dept. P, PO Box 20153, Sacramento, CA 95820

REISCH WORLD WIDE COLLEGE OF AUCTIONEERING, INC. World a Largest-48 Years. Tarm soon, Free Catalog. Approved for VA. Modern Auction Library **"FREE"** with enrollment. 515-423-5242 - Col Gordon E. Taylor, P O Box 949, Dept. 19, Mason City, IA 50401

BARTENDING - Bar Management Home Study Bartending Training, 3843-C San Fernando Road, Glendale, CA 91204

UNIVERSITY DEGREES BY MAIL Programs! Bachelors, Masters, PH.D's . . . Free revealing details Counseling, Box 317-PM10, Tustin, California 92680

EXTENSION And Post-Greduata Awards in Philosophy, Art, Science Botanic, Medicine, Homeopathy, Radionics, and others. 30 subjects Curncular free (airmail $1 00 refundable). Registrar, Sussax Collega of Technology, Highfield, Danehill, Sussex, England.

RADIESTHESIA, Radionics, Dowsing E S P Courses and Equipment Illustrated Catalog $1 00 (refundable) Established 27 years. Dept. PM/R, Bruce Copen, Highfield, Danehill, Sussex, England RH17 7EX.

LEARN Asleep or awaka Records, tapes, equipment! Fraa catalog! Drawer PM-400, Ruidoso, New Mexico 88345

AUTOSUGGESTION. Sleep-learning headquarters! Tapes, records, books, Gigantic catalog Iree Research Association, Box 24PM, Olympia, Washington 98501.

DETECTIVE Profession, Easy home study; free tie-tack or lapel pin, certificate future. Professional Investigators Training School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

INSTANT MEMORY . . . NEW WAY TO REMEMBER. No memonzation Ralease "photographic" mamory. Forget nothing! Liberates extraordinary knowledga, talents, ESP. Immediata results! Free information Institute of Advanced Thinking. 845PM ViaLapaz, Pacific Palisades, California 90272

COLLEGE DEGREES BY SPECIAL EVALUATION of **EXISTING** Credits & Job Experience. Fast. (814) 863-1791. Writa. Box 13151-M10, Columbus, Ohio 43213.

ACCREDITED Collega Degrees By Mail Details. **GRADUATE REFERRAL SERVICE,** 3010 Santa Monica Blvd., Suita 173-PM, Santa Monica, CA 90404

CLOCK AND WATCH REPAIR Books. Free catalog North American, Box 77-AXA, Fox River Grove, Illinois 60021

LEARN Sewing Machine repairing A profitable Trade Easy to learn. Fraa details. Sewing Center, 187 FR, Rochelle, GA 31079.

BE A DETECTIVE. Free Information -Equipment. Global, Box 191, Hanover, MA 02339

USED Courees! Books! Lists 25¢. Smith's, 124 Marlborough, Salam, Massachusetts 01970

TYPEWRITER Rapair at home Moneymaking career. Typewriter Inst., 147A Crooks, Paterson, N.J 07503

HANDLE YOUR OWN LEGAL AFFAIRS - or start a naw career Corporations, Wills, Real Estate, Divorce, Contracta, Lawsuits . . . much more Accredited **PARALEGAL** program instructed by attorneys - homa study. Fraa Catalog. **SOUTHERN CAREER INSTITUTE,** Administration, Drawer 2156, Boca Raton, Florida 33432. (305) 368-2522.

HIGH SCHOOL at home, no classes Diploma awarded Information **FREE,** phone free anytime 1-800-228-5600, or writa: American School, Dept. 31045, 850 E. 58th St., Chicago, Il. 60637.

DESIGN Strength Calculations Made Easy . . . Free Proof . . . Designers Manual, Box 1073-G, Scottsdale, Arizona 85252

SAVE $$ Accredited Undargreduata Greduata degrees. Minimal/No rasidency. Free details: Counaelor, Box 3057M, Kent, Ohio 44240

COLLEGE Money! Billions in scholarships yearly! Computer reveals whera tha money is for you! Rush name for application— Tantus, Box 12291-R, Minneapolis, Minnesota 55412

COLLEGE DEGREES By Mail Accredited Bachelors, Masters, Ph D's. Free Facts Revaaled. Careers-PM10, Box 45886, Tulsa, DK 74145.

LEARN BOOKKEEPING/ACCOUNTING. Great opportunities for man/women. Write ACI, Box 11704, Santa Ana, CA 92701.

FREE 120 page Career Opportunities Guide - shows how to train at home for top paying jobs Granton Institute, 263A Adalaide Street West, Toronto, Canada M5H 1Y3.

BARTENDING/Bar Managament. Home-study diploma course. Free booklet from: Rapid Results School, Dept. PM, 10113 Washington Street, Bellflower, CA 90706.

IMPROVE YOUR ENGLISH. 50 Minuta Cassette $8.00. David Russell, 4354 St. Johna Ave., Jacksonville, FL 32210

LEARN to raad tha New Testament in Greek, by Correspondance atudiea Free info. Send SASE to: Biblical Greek, 112 Elm, Park Forest, IL 60466

EMPLOYMENT INFORMATION

JOBS OVERSEAS . . (Including Alaska). Free Details. Global Employment, Box 51933PM, San Diego, California 92138

FLORIDA EMPLOYMENT NEWSLETTER. Complete Sunshina State Coverage Weekly. Free Details. Fen, Box 845PM, Jupiter, Florida 33458

AUSTRALIA - The World! 50,000 Jobs! Top pay. Transportation Computenzed reports $2.00. Jobworld, Box 681E, Cypress, CA 90630.

ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER!! Colorado, Idaho, Montana, Wyoming!! Current Openings — All Occupations!! Free Details . . . . . Intermountain-L, 3506 Birch, Cheyanne, Wyoming 82001.

JOBS Overseas-Big money fast $20,000 to $50,000 plus per year Call 1-716-842-6000, Ext. 360.

JOBS: COLORADO, WYOMING, UTAH, IDAHO, MONTANA! Computerized newsletter with 200+ new jobs aach week Free details. **MOUNTAINWEST,** 925-PM Canyon, Logan, UT 84321.

JOBS: Overseas—Maritime Trainees to $50,000 + Free Details. Write: Dars, Dept. PM-24, Box D10, 258 Park Street, New Havan, CT 06511

RIVERBOATS -Tugs $15,000-$60,000. Expenses paid. Work month. Home month. Experience unnecessary. All water-ways including Alaska, Hawaii. Free report. Send stamp anvelope. Marine Employment, Box 207, Central, Indiana 47110

JOBS Experts **PROVEN** Tips For Finding, getting. Excellent $3 00 Johnanne'a, 6879 Thomas, Liverpool, New York 13088

JOBS! How To Find Ona **FAST! FREE DETAILS.** Tiberiua Press, PM10, 6062 E. 58th Pl., Tulse, Okla. 74135

MONEY - Overeeas Opportunities Listing $3.00. JL Enterprises, P.O Box 170532, Arlington, Texas 78017

HELP WANTED

AUSTRALIA WANTS YOU! Jobs! Big Pay! Transportation! Newest Handbook — $2.00. **AUSTRALIAN INTERNATIONAL,** Box 19107-AJ, **WASHINGTON, DC** 20036

OVERSEAS Employment . . $20,000 - $60,000+. Free Report! Employment, Box 19760-AJ, Indianapolis, Indiana 46219.

ELECTRONIC Firm is looking for assemblers interested in working at home Send $3.00 application fee IRDC, Joppa Hill Place, Manchester, N H. 03102

DEALERS WANTED! Earn $20,000 00 or more at Home through MLM. Send $2.00 to: KeySala Inc., 8605 River Road, Richmond, VA. 23229

FOR INVENTORS

LEARN How to offer your invention for sala or licanse Free Booklet outlines procedures, royalty ratas, requiraments. Kessler Salea Corporation, C-5-Ft, Fremont, Ohio 43420.

PATENT AND DEVELOP Your Invention. Registered Patant Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every Inventor Should Have. Richard L. Millar, Woolworth Building, 233 Broadway, Suite 3612-M. New York, N Y. 10007. (212) 267-5252.

NONPROFIT Foundation helps inventors Widest range of services Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B, Iowa, Coloredo Spnngs, CO 80909

PROTECT Your Invantion. Registered Patant Attorney. Many Years Experience, all Fields Individual Inventor'a Problems Givan Special Considaration. Very Raasonable Charges. Write for Free Information. Paul H. Gallaghar, 2530 Crawford Ava , Evanston, Illinois 60201

REGISTERED PATENT ATTORNEY Washington D.C. Suburb. Donald A. Kettleatrings, 414 Hungerford Drive, Rockville, Maryland 20850

PATENT IT ECONOMICALLY! Free Datails. N. Raner, 2008 Fondulac, Richmond, VA 23229

PROTECT YOUR INVENTION. Registared Patant Attorney **FREE** Preliminary Review Of Your Description. Box 392PM, Millwood, NY 10546

THINGS To Invent, Inventors Club, Box 19611, Fayetteville, Ohio 45118. Free Information.

(Continued on next page)

FOR INVENTORS

(Continued from preceding page)

COMPLETE MANUAL FOR INVENTORS - Understanding the system. Is a search required. Step-by-step instructions for filing your own application for patent. Finding a licensee. Sample patents and licenses and more. Send $19.95 to: ABROX, Box 842, Santa Ana, California 92701 to receive your Manual by return mail.

GUARANTEED HELP! Problems finding components, engineering, production? Twenty years development uncovers thousands of sources. Every possible service or product. If you are serious about your idea, send $10.00 for complete information. Registered Professional Engineer, Money back guarantee. MG-Tech, Box 152, Knoxville, IL 61448

PATENT YOUR Invention Yourself!! Inexpensively! Retired Examiner, 7400, Washington, DC 20044

INVENTORS—STOP Selling Yourselves Short! Hear what a Veteran Inventor has to Advise. 60 Minute Cassette and Print Materials. $15. Eagle One Productions, P.O. 6713, Duluth, MN 55806

INVENTIONS WANTED

INVENTORS: Free information on offering your invention for sale. Kessler Sales Corporation, C-5-IW, Fremont, Ohio 43420

IDEAS, INVENTIONS, NEW PRODUCTS WANTED!
MARKETING Assistance available to individuals, tinkerers. Universities, companies. Write for Kit-PM.
INVENTION MARKETING, INC.,
701 Smithfield Street
Pittsburgh, PA 15222

EARN ROYALTIES. NUPRODUX INTERNATIONAL, 1377 K. NW 141, WASHINGTON, DC 20005

INVENTIONS WANTED. FREE CONSULTATION. NO IDEA TOO SMALL. Disclosure registration. Potential cash or royalties from manufacturers seeking new ideas. For free information on how to register your idea, call or write. **AMERICAN INVENTORS CORPORATION,** 59 Interstate Drive, Dept. PM, West Springfield, MA 01089. (413) 737-5376. A Fee Based Marketing Company. Offices Coast to Coast.

REAL ESTATE & FARMS

FREE! BIG Fall-Holiday Catalog! Over 5,400 country properties described, pictured! Land, farms, homes, businesses, recreation, retirement values! Selected best of hundreds of offices All Across America! **STROUT REALTY,** Inc., Plaza Towers, Dept. 5800, Springfield, MO 65804. Call toll free. 1-800-641-4266. In Missouri call collect. (417) 862-4402.

NEW . . . FREE . . . FALL CATALOG! Top real estate values coast to coast! Please specify type property and location desired. **UNITED FARM AGENCY,** 612-PM West 47th, Kansas City, Mo. 64112.

OZARKS: Scenic, Peaceful; Clean Environment, Information. Umbenhower Realty, Box 15C, Willow Springs, Missouri 65793. 417-469-2764.

CANADIAN Country Properties. Our 67th Year. Terms available. Moneyback guarantee. Catalog airmailed $1.00. Dignam Corp., Ltd., Suite 496, 85 Bloor Street, East, Toronto, Ontario, Canada M4W 1B5

CALIFORNIA. Lots $40 down $40 monthly. Box 35291, Los Angeles, 90035

FISH, Garden, Homestead, Retire or Invest. Homesites $4595 Up . . . $495 Down. Terms, Illustrated Brochures. VAL-U, 611P US41 So., Invernesa, Fla. 32650

BUY Real Estate Using Other "Folks Money." 10 Day Money Back Guarantee — Send $6.95 for Book, Post Office Box 214, Galena, Alaska 99741

HUNTING, FISHING PROPERTIES From $47. to $107 per acre in Canada! Send for **FREE CATALOG.** Investment potential. 2 year exchange privilege. Canadian Estate Land Corporation, Dept. 23C, 2411 Yonge St., Suite 303, Toronto, Ontario, Canada M3P 2E7 (416) 488-0444

EXPORT-IMPORT

+2500 "Fast-Sellers." Free Brochures! Ballrightco, Box 91309-B10, Cleveland, Ohio 44101

HOW TO SAVE $200 A YEAR BY IMPORTING $1.00 Moneyback Guaranteed. Don Russell, 1277-M Yulupa Avenue, Santa Rosa, Ca. 95405

PLASTIC BAGS

ALL Sizes. Buy Small Quantities. Free Catalog. SAKst, 6151-C Colbath, Van Nuys, Calif. 91401

SUPERSIZE 55 gallon, $25 per hundred **POSTPAID.** Superbag, Box 84, Crestline, KS 66728.

BUY IT WHOLESALE

BELOW Wholesale Clothing, Jewelry, Closeouts, Catalog $1.00. Torrow Mac, P.O. Box 3333PM, Anderson, S.C. 29621

HANDCRAFTED State Border Map Clock, Quartz! Specify State(s). $29.95 Plus $4.00 Shipping each. Shirdan, 2950 South Shaver, Suite C19, Pasadena, TX 77502

BELTS and Buckles. Complete line fast sellers, including truckers, motorcycles, wildlife, westerns etc. Big Profits. Complete dealer set up. Catalog $1.00. Anchor Specialties, Box 3958-BPM, North Providence, RI 02911

SAVE! FREE CATALOG! Motorcycle, Snowmobile, Small Engine Parts. Woodstoves, Log Splitters, Energy Items. Manufacturer's Supply, Box 157-PM3, Dorchester, WI 54425

400,000 BARGAINS Below Wholesale. Many Free! Liquidations . . Closeouts . . Job Lots . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49423

CLOSEOUT Jewelry 55¢ dozen. (Catalog 25¢), Roussels, 107-1631 Dow, Arlington, MA 02174

CLOSEOUTS! Discounts! Below wholesale! Freebies! Samples! DDN, Box 20152-PM, Ferndale, Michigan 48220.

BATTERY CLOCK MOVEMENTS. Hands, Hardware, Finest Quality. Discount Prices. Catalog $1.00. Refundable. Yankee, Box 26, Thompson, Connecticut 06277

EARN Money selling rings, jewelry, buckles, watches—buy direct. 130% below retail. Catalog $1.00 (refundable). Anka-PM, Box 89, West Warwick, RI 02893

FANTASTIC 300% profits quality rings, jewelry low wholesale prices, Catalog $1.00 (refundable). Rainbow (PM) Creations, 160 Waverly Place, San Francisco, CA. 94108

WORLDWIDE BARGAINS: Imports . . Dropship . . Closeouts . . Freebies . . Surplus . . SASE. Marnees, Box 1717-PM, Highland, Indiana 46322.

EVERYTHING TOOL Opens Jars, Tongs, Cracks Nuts, Screwdriver, Pliers, Hammer. Send $3.98 +50¢ Postage. Casi-len Enterprises, 1151 Alcyon Place, P.O. Box 157, Uniondale, New York 11553

INEXPENSIVE JEWELRY, beautifully displayed. M. Kurman, 949 Broadway, New York, NY 10010

VACUUM CLEANER Parts Catalog. Vac Sew, 20113 Vanowen #5465M, Canoga Park, CA 91606

4,947 products from Taiwan at low Oriental prices. Galaxy, P.O. Box 1062PM, Marietta, Georgia 30061

CLOSEOUTS! Shoes $1.00, Tubesocks 30¢ and More. Catalog $1.00. Bee's, 3341PM Snowridge, Memphis, TN 38115

BUSINESS SERVICES

STOP addressing labels by hand—Professional labels monthly. Information. Post Labels, 1511 Post Avenue, PM10PL, Torrance, CA 90501.

RUBBER STAMPS

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail $1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106

RUBBER STAMPS. Your 3-line address made for $2.00. "Holland", Dept. P1082M, Box 58311, Louisville KY 40258

PRINTING PRESSES, RUBBER STAMP OUTFITS

TYPE Fonts. Hand Printing Presses, Supplies. 120 Pages. $1.00 Deductible first order. Acme Type, 1720 N. Marshfield, Chicago, 60622

PRINTING Presses, Type, Supplies. List 50¢. Turnbaugh Printers Supply, Mechanicsburg, PA 17055

TYPE for printing. Catalog $1.00/deductible 1st order. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344

MANUFACTURE Rubber Stamps. Regular and Pre-inked. Catalog 1-800-851-4945. Jackson, Brownsville Rd., S110, Mt. Vernon, IL 62864

PHOTOENGRAVING Cuts Made. Delouisa, Box 108, Islip Terrace, New York 11752

COMPLETE Rubber Stamp Outfits, Supplies. Same day shipment. Sign Engraving Machines, Wholesale Catalog $1.00 Deductible. Star Stamp, 1720 N. Marshfield, Chicago, 60622

PRINT YOUR OWN— Printing presses, type, supplies direct from factory. Send $1.00 for catalog and samples to: Kelsey Co., DM, Meriden, Conn. 06450

PRINTING AND SUPPLIES

QUICK Copy Printing. Low Prices. Write. Nationwide, 614 North Main, Bloomington, Illinois 61701

LETTERHEADS, 2 Colors, w/env. $17.50. Low, 24 Post, Newfoundland, NJ 07435

THERMOGRAPHED Business Cards, Free Samples. BG, 2501 Sapling, Glenshaw, PA 15116

PRESSURE SENSITIVE QUALITY DECALS - 1"×2½" Black On Chrome. Address Or Message (55 letters) $19.95 per hundred. California Add 6%. Use On Metal, Glass, Wood, Plastic - Outdoors, Indoors. 5 Weeks Delivery. Check-Visa-Mastercard (Number-expiration date) to: Root Company, 320 North Park Vista, #92E, Anaheim, California 92806. Satisfaction Guaranteed.

GIFT SHOPPING

GIFTS - Charming, Unique Selection. Something For Everyone. Catalog Free. Gilmar Gift, Dept. 4LMP1, 1716 Ocean, San Francisco, CA 94112

CLOCKS, WATCHES, OLD GOLD JEWELRY

HIGHEST CASH for Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Free gift with information. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 258, Chicago, 60603.

WATCH And Clock repairing books, tools, materials. Free Catalogs. North American, Box 77-AX, Fox River Grove, Illinois 60021

TAKE NO CHANCES. Deal with oldest, most reliable firm in old gold business. Established 1934. We buy Gold, Silver, Platinum, Diamonds. Highest Cash. Free Information. Rose Industries, 29-A East Madison, Chicago 60602

LCO watch $2.50, Penwatch $3.60, Catalogue $1.00. Reliant, P.O. Box 33610, Sheungwan, Hongkong.

PRECIOUS STONES & MINERALS

GET Free catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free new catalog just off the press, yours for the asking. Write Gregor's, Dept. 1, 900 South Arroyo Pkwy., Pasadena, California 91109

TREASURE FINDERS

TREASURE Hunters. Complete line. Electronic Detectors. Pendulums. Books. Hobby or profit. Free catalogue. Detectores, Apartado 7-905, 06700 Mexico.

WHITE'S Metal Detectors. Catalog $2.00. Refundable With Order. Treasure-B, 600 Pleasure, Mundelein, Ill 60060

FIND Lost coins, jewelry, buried treasure, gold nuggets, relics. New revolutionary patented detector analyzes objects, tremendous range, no ground pickup. Free catalog. Gardiner, 4729M N. 7th Ave., Phoenix, Arizona 85013

TREASURE- Locate quarter mile away with ultra sensitive locator - brochure free. Research Products, Box 270270 - AMC, Tampa, Florida 33688

GOLD, SILVER, coins, relics - Find with unique patented treasure finder units - None better, low prices. Free information, write. Techne, Dept. C3, 11900 Montana Avenue, El Paso, Texas 79935.

PROFITABLE OCCUPATIONS

TECHNICAL WRITERS make big money! Free details: TekPubs, Box 2458-P, Oroville, CA 95965

REPAIR Lawnmowers thousands of parts and tools. Wholesale list 35¢. Ellwanger's, 15 Canal St., Port Jervis, NY 12771.

FREE Catalogs. Repair air conditioning Refrigeration. Tools, supplies, full instructions. Doolin, 2016 Canton, Dallas, Texas 75201.

FT. SMITH Auction School. Ft. Smith, Ark. 72903. Resident & Home study. Veteran Approved.

PLASTERCRAFT!!! Profitable home business. Molds available. Details: Lynnetta, 6251C Mentor Park, Mentor, Ohio 44060

SERVE FEDERAL SUBPOENAS Your State. Good Fees! Must Be Over Eighteen. Details $2.00. Constable's Office, Boston, MA. 02188-0314

SALESMEN-DISTRIBUTORS

MAKE EXTRA MONEY DURING YOUR SPARE TIME! Show our New Line of Calendars, Pens and Popular Advertising Gifts to local firms. Prompt, friendly service from small town AAA-1 Company in our 73rd year. No investment or collections. Weekly commissions. Be your own boss. Full time potential. No experience necessary. Write to: Frank Buckley, **NEWTON MFG. CO.,** Dept. PMC10, Newton, Iowa 50208

SELL SENSATIONAL LOW-COST PRE-ENTRY PROTECTOR for Automobiles-Buildings. Exceptional Distributor margin. Northwest Electric, 3022, Box 1046, Mitchell, SD 57301-1046

AGENTS WANTED

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 3384, Hanover, PA 17331.

GET immediate commissions. Take orders for quality Mason Shoes from friends and neighbors in your spare time. No risk. No investment. Write today. Mason Shoes, K669, Chippewa Falls, WI 54774.

PRINTING Advertising Salesmen—Excellent money making sideline selling Decalcomanie Name Plates, small quantities. Advertising Specialties, sign letters. Free samples. Ralco XL, Boston, Mass. 02119

(Continued on next page)

AGENTS WANTED

(Continued from preceding page)

INSTANT SALES MAKE COLD CASH Make up to $150 on single sales for Chemical Ice Melter Developed by National Manufacturer. Ideal product for fall and winter income. One second demonstration sells factories, storekeepers, drive-ins, banks, shopping centers, schools. One of a kind guarantee. Commissions advanced weekly. Free kit, write: Pace 49, Dept. 229, 81st & Indiana, Kansas City, Missouri 64132

BELL Games!!! Excellent commissions. Elite Games, Box 2423, Yakima, WA 98907-2423.

UNEMPLOYED? UNDER PAID? TIRED OF PRESENT EMPLOYMENT? try this! **EXCITING INCOME.** My company seeking Sales Agents. Ideal Home Business Opportunity. No Experience Needed! Start immediately. An exciting future awaits you! $1.00 Full Details. Five Lakes Enterprises, 6626 18th Avenue, 2A10, Kenosha, Wisconsin 53140

BOOK SALES — Serious about making big money? We'll show you how! Send $1.00 for details. Action Publishing, Box 41301, Dept. PM10, Minneapolis, MN 55447

FOR FAST BIG PROFITS Sell how-to-make money books by mail. Unusual Opportunity. Details Write. J&B Assoc., P.O. Box 3028H, Saxonville, MA 01701

PLACE our coin postage stamp vending machines into stores in your area. Fill machines monthly. Profitable part-time business. Small investment. Steiner Manufacturing-PM, 617 Sackett, Brooklyn, NY 11217

INDIVIDUALS Needed Now! Part/Full Time. Your Chance To Make Big Money Fast. Selling "How To Make Money" Books By Mail. No Experience Needed!!! Details $1.00. H. Forero Publishing, P.O. Box 7338, Glendale, CA 91205

MAKE MONEY IN SPARE TIME. As a subscription sales representative for leading national magazines, you can earn generous commissions while learning the art of selling. Instructions and supplies will be sent to you free. Send this ad with your name and address to: **POPULAR MECHANICS,** Dept. AB-L, 250 W. 55th St., New York, NY 10019

BUSINESS OPPORTUNITIES

ASSEMBLE PRODUCTS AT HOME. Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 92B Brighton 11th, Brooklyn, New York 11235.

VINYL'S Where the money is! Professionally repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small $20 jobs a day earn you $1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details free. VIP, 2007 Montrose, Chicago, 60618

PIANO Tuning learned quickly at home! Free information. Empire School, Box 1014, Jupiter, Florida 33458

RECONDITION JUNK BATTERIES. Spare time home business brings big profits fast! Free Information. J&M, Box 771PM, Battle Ground, Washington 98604

IMPORT -Export opportunity, profitable wond-wide, mail order business from home, without capital. We ship plan for no risk examination. Experience unnecessary. Free Report. Mellinger, Dept. R270A, Woodland Hills, California 91367

BRONZE BABY Shoes! High Income Home Business. Company Assistance. Metalcraft 01E10, East Providence, RI 02914

MAKE Durable Building Plastic Easily. Waterproof, Fireproof, Economical. Bays Laboratory, 2086-2075 Drive, Cedaredge, Colorado 81413.

BECOME Tax Consultant. Our students earn $1,000-$3,000 every tax season preparing returns evenings. State approved. National Tax School, Monsey 2KP, New York 10952.

$700 Per month earnings possible filling out income tax forms at home or tax office during tax season. We show you how. Simple, quickly learned. Details mailed free. No salesmen. Hurry. Big demand. Federate Tax, 2065 Montrose, Chicago, 60618

FANTASTIC BUSINESS OPPORTUNITY Complete streamlined guide to **MAILORDER RICHES.** Rush $5.00 to: Williamson, 1681 N.E. 26Th Street, #232, Ft. Lauderdale, Florida 33305

SUCCESSFUL Home/Mailorder Businesses You Can Operate. EDBOOKCO, Box 2133B, Reseda, CA 91335.

CRAFTSMEN- Earn Extra Money Building Dollhouses. Send $7.00 For Complete Plans And Catalog. Houseworks, DPM, 2388 Pleasantdale, Atlanta, GA 30340

ADDITIONAL INCOME! Mail order book dealership. Cowing Promotions, Box 18401, Las Vegas, NV 89114

HOT selling **CAR-COP™** guarantees best automobile theft protection at lowest cost! 334% Profit! Sample $6.95. Catalog **FREE!** Almquist Manufacturing, Dept. GT10F, Milford, Pennsylvania 18337

MAILORDER OPPORTUNITY! Start profitable home business without experience or capital. Write for free book, case histories, plus complete details. No obligation. Mail Order Associates, Dept. 32, Montvale, NJ 07645

"100 Ways to Make/Save Money". Little known secrets revealed—$3.00. Write- Century House, Box 21477B, San Jose, CA 95151.

$4,000 MONTHLY possible mailing financial letters-Free Details- Manco, Box 5051B, Pasadena, CA 91107

REPAIR Windshields, Plate Glass! Lucrative. Protected Territory. Free Training! Glee-Wald Systems, P.O. Box 87, Hillsboro, OR 97123 (503) 640-2278

HOW TO EARN WEALTH!! . . Own business builds financial independence . . . Proven methods . . . **FREE DETAILS!** . . . New Horizons, Box 39065, Denver, CO 80239

BIG Money In Monument Sales. Full/Part-Time. P.O. Box 846, St. Cloud, MN. 56301

SELL Books By Mail. Profitable. Write. Musgrove-1A10, Altus, AR 72821.

MAKE $15.00 Hourly building custom luggage/cases at home. Huge nationwide demand. Fill mail orders. We supply materials, instructions, everything! Free details. Custom Case, 6067 De Soto Ave., Dept. C20-22, Woodland Hills, CA 91365.

MAKE WOOD TOYS FOR PROFIT. Toy parts, patterns wholesale. Lovebuilt Toys, PM10, Tahoe City, CA 95730-5459

MAKE 2 TO 3 times your cost on hundreds of products. Gift items, novelties, toys, carded merchandise, 1001 others **FREE DETAILS,** Elge Specialty, 282 Harbor Road, Staten Island, New York, 10303

MAKE HOMEMADE BOOKLETS. I've earned $187,000 with mine. Free Information. Falcon, Box 548, Woodville, Texas 75979

TAKE Catalog Orders. We drop-ship 2500 best-selling specialty products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 6061 De Soto Ave., Dept. 20-22, Woodland Hills, CA 91365.

GET Rich Quick? No, just steady income without investment. Wholesale Specialty Merchandise Information. Post Enterprises, 1511 Post Avenue. PM10SM, Torrance, CA 90501.

MAKE Millions **MANUFACTURING BATTERIES.** Supplies Available. Everlast, Box 365, Bogota, NJ 07603.

$1104.00 Monthly For Ten Hour Work Week! Guaranteed!! Homework . . Start Immediately . . . Paid Daily - Free Information/Application - AHV, Box 1028-A10, Kalaheo, Hawaii 96741

MAKE Rubber Stamps. Highly Profitable Business. Free Details. Stamper, POB 22809 (GC), Tampa, FL 33622.

GET RICH!! Secret Law smashes debts---brings cash and credit!! Details **FREE!** WealthKit-WB-10, Billings, NY 12510

WOODWORKERS - IDEAL HOME BUSINESS. Free Brochure! Pine Shop, 78P, West Peterborough, NH 03468-0078

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Telfer Drive, Morgan Hill, Calif. 95037.

PICTURE Framing—Profitable full or spare-time business. Easy to learn with handbook-course "Guide To Picture Framing Profits." $3.00 Guaranteed. Free framing-supplies catalog included. Japs, 126-PM Seventh North, Hopkins, Minnesota 55343

REPAIR HYDRAULIC JACKS — DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BRDWNSVILLE, TEXAS 78520.

DEBTS WIPED OUT with secret Federal Law!! Fortune building **FREE REPORT!** Blueprints #B-10, LaGrangeville, NY 12540

FREE BOOK 2042 Unique Proven Enterprises. Fabulous "unknowns," Second Inflation Income. **HAYLINGS,** Carlsbad, CA 92008

LEARN Sewing Machine Repairing. Men Women Lucrative Profits. Gresslin Correspondence School, Box 927, Spencer, Iowa 51301.

$480 Weekly. Home mailing program. Goodwond, Box 26233-R, Tamarac, Florida 33320

$92.00 From Square Foot Plywood (Huge Demand). Revealing Proof 25¢. (Refundable). Woodwin, Bridgewater, Mass. 02324

CONCRETE Block Machines. Catalog $1.00. Route One, Box 95, Rapid City, South Dakota 57701

SELL Books By Mail. Free Dealership. Midwest, Box 44R2-PM, Shawano, Wis. 54166

SCREEN PRINT T-SHIRTS. Inexpensive kits. Free Details. "T-Printer," POB 23991(GC), Tampa, FL 33623.

GET RICH using **OTHER PEOPLE'S MONEY!!** Unique — amazing business!! Details **FREE!!** Finance Consultants, 5B-10, Billings, NY 12510

MAILORDER $1,000.00 POSSIBLE MONTHLY Selling Information. Free Details. RSVP, Chatsworth Ave., Box 301-F, Larchmont, New York 10538

NEW Discovery in Battery Reconditioning . . Eighteen Months Guarantee Means "Big Profits Fast." Electone, 7415 Gable Drive, Little Rock, AR 72205

BUMPER STICKER PRINTING DEVICE. Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GC), Tampa, FL 33622

I MADE $40,000 Year by Mailorder! Helped others make money! Details 25¢. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

CLIP newspaper items — $2 - $25 **EACH!! FREE** Report! Clippings-KB-10, Billings, NY 12510

1000% Profit Bronzing or Chinakoting Baby Shoes. Free Literature. NBSPM, 398 Airport, Sebring, Fla. 33870

PROFITABLE GOLD FOIL PRINTER. Personalize business cards, pencils, matches. Free Details. Gold, POB 24986 (GC), Tampa, FL 33623.

LEARN The secrets of repairing junk batteries. "Fabulous Profits." **FIRST ESTABLISHED COURSE.** Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

MONEY SECRETS! Help People and businesses get money. Easy home business. Fantastic Profits. No Experience—Own Hours. Continuous Assistance. Free Details. DFC, Dept. 10-G-10, 1145 Reservoir Avenue, Cranston, Rhode Island, 02920

VENDING MACHINES. No selling. Routes earn amazing profits. "Big Catalogue **FREE.**" Parkway Corporation, 1930 PMB Greenspring Drive, Timonium, Maryland 21093

CARPETLAYERS Earn To $3000. Monthly. Easy Home Training. Big Demand. Free Catalog. Carpet Crafts, 390 Dawson Drive, Camarillo, California 93010

$100.00 a Day Wholesaling. Free Brochure. Thomas Company, 211 Centre Street, Holbrook, MA 02343

$100,000.00 A YEAR POSSIBLE!!! Work at Home . . . Spare Time . . . **GUARANTEED!! FREE INFORMATION.** Doug Driscoll, Box 06482, Portland, OR 97206

$35,000/ year window cleaning. One men operation.....Free information.."**WINDOWS**", Box 428, No. Attleboro, Mass. 02760

BATHTUB REGLAZING is where the money is. Our system makes old tubs shine like new for fraction of replacement cost. For fact filled portfolio send $3.00. Unique Coatings Corp., 300 McKinstry, Detroit, Michigan 48209.

MAKE — Sell Attractive Personalized License Plates. Inexpensive. Sizeable Profits. Pro-Plate, POB 22809 (GG), Tampa, FL 33622

MONUMENT Sales Bring Big Dollars. Details. Monuments, 5095 Akron Cleveland Rd., Peninsula, Ohio 44264

ASSEMBLE PROFITABLE DEVICES AT HOME. Exceptional opportunities without investment. Enterprises, 1133-MP Linwood Place, Utica, NY 13501

ACHIEVE Independence through carpet cleaning. Details - Marbry, 4315 Charter Point, Jacksonville, FL 32211

FREE Computer Report reveals this year's hottest, new ventures. SBRE, 14244 SE24, Bellevue, WA 98007.

LEARN HOW Bookkeeping By Mail. Business Increases Your Income. Free Details. Jayhill's, Dept. 33, Box 5362, Little Rock, AR. 72215.

PROJECTION TV . . . Make $200.00+ per evening assembling Projectors . . . Easy . . . Results equal to $2,500 Projectors . . . Your total cost less than $15.00 . . . **PLANS, LENSES** & Dealers Information $14.00 . . . Illustrated information **FREE** . . . Macrocombbx, Washington Crossing, Pennsylvania 18977. Creditcard orders 24Hrs. 215-736-2880.

BEAT INFLATION. Operate Wholesale Business. Hundreds of Products. Instructions. Details. Merchants Distributing Company, Dept. PM-1082, 18 Mayflower Court, Centerport, N.Y. 11721

SELL Books By Mail. 400% profit. Literature Free. Paragon, 344PM Forest, Cass Lake, Minnesota 56633.

SALES Agent Wanted Now. Sell Unusual Money Making Opportunity Books. Full Details, Send $2.00. Kalm Publishing Company, Box 987, Stanley, ND 58784

SOLAR Heating learned quickly at home! Free information. Empire School, Box 193, Rockville, IN 47872

WHOLESALERS NEEDED. Unlimited earnings. 2500 products. Free Information. Millare, Box 87169, Irwin, Idaho 83428

RETIRE WEALTHY, Big Profits Within Days. Sell How to make money books by mail. Details. Brim Publishing, P.O. Box 958, Dept. 6N, Springfield, Ohio 45501

HOME WHOLESALE BUSINESS! Giftware. Moss, PM-10, Box 1153, Slidell, La 70459-1153

MAKE MONEY WOODWORKING - Easy profits making unusual gifts, toys, novelties. Free details. Williams, 32K Titus, Glen Cove, NY 11542

$2,000.00 every week possible ! ! ! Build and sell **"PROFESSIONAL" GIANT SCREEN TVs** . . . "Don't be fooled with cheap imitations!" . . . "Use **EXACT SAME TYPE LENSES** and **SCREENS** utilized by Sony, Zenith, Pioneer, and Magnavox!" . . . Simple construction! . . . Illustrated dealers information and complete parts catalog $2.00 . . . Money Back Guarantee! . . . **POLI-VISION,** 168-B Dunmore St., Throop, Pa. 18512

14K Gold, Sterling Silver Jewelry. Make 300% Profit. Catalog $1.00 (Refundable). Courticco, 1634 Bogart, Bronx, NY 10462

MAILORDER: Sell 70 Moneymaking Reports — 1000% Profit! **VENDIX,** Box 336, Rivera, AZ 86442.

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

EASY MONEY* Selling Information By Mail. Free Details. Kittex, 830 Richmond, Sicklerville, New Jersey 08081

DISTRIBUTE Information Professional, Profitable, Enjoyable. Free Details. Direction82X, 16908 Kristin, Torrance, Calif 90504

$160,000 Plus Yearly . . . Possible Now!! "The Incredible Money Game" Reveals **BLOCKBUSTER** Mailorder Method. Simplified Instructions. Report Free. Financial Press, Box 26663A, Indianapolis, Indiana 46226

AVOID PITFALLS! Experienced mail order guidance. Free direction. "MOM-POM", 953 Sayer, Springfield, Missouri 65603

$3,000.00 Ona Sale! Brokeraging Equipment. Experience And Capital Unnecessary. Call Free For Information. 1-800-824-7979 (In California 1-800-952-5656) International Product Exchange.

GET Rich!! Self-Made Millionaire Reveals Secrets. Free Details. Wishing Well, Box 251, Destin, FL 32541.

DISTRIBUTOR to place a fast selling publication on consignment with newsstands. $100,000 per year possible! Mr. Information, POB 86320-PM, North Vancouver, Canada V7L 4K6

SALES Agent Needed, Enormous Profits, Sell our "How to" books by mail. $1.00 for details. GAR International, Box 7307-4A10, San Diego, CA 92107

SALES Agents Wanted Now! Make Money! Sell Unusual Money Making Opportunity Books By Mail. Free Details. United Mailer's, Box 11447-B10, Bradenton, Florida 33507

PROFITABLE home business. Small investment. Details. Thomas, 653B Rose, Twin Falls, Idaho 83301

GUARANTEED Fortune builder. Absolutely unlimited potential. Write today. Pierpont, 1205 Kenilworth (P10), Charlotte, NC 28204

FREE BOOK! BEGINNER'S GUIDE to starting a mailorder business! Clarke, 1424 Irish Hill-D11, Biloxi, MS. 39530

UNIQUE picture-taking business plan. Camera Ventures, 14589F West 32nd, Golden, CO 80401

NEW MULTI- LEVEL mailorder opportunity. Sun Publishing, Box 2222, 1J, Truckee, CA 95734

EXCELLENT Profit Potential Running Your Own Distributorship. Start Small, Grow Big. Free Information. SASE. WEB Enterprises, Box 511, Romulus, MI 48174

DIE-MAKING! New manual revealing information explaining this highly paid profession now available to mechanically inclined. Postcard bringe free details. Directacor, Trimex Building, Mooers, N.Y. 12958

EARN hundreds weekly at Home by Mail. **START IMMEDIATELY!** Write **KASH** 8000, Box 31051, Indianapolis, IN 46231

HOW to raise $10,000.00 Overnight. Send $1.00 to KeySale Inc., 8605 River Road, Richmond, VA 23229

RICHES or rip offs? Know the difference. Truth about Business Opportunity ads. Free information. Seco, P.O. Box 724, Hevertown, PA 19083.

SELL ADDRESSES! GREAT PROFITS! IN ADVANCE! Government Sources Revealed. Details $1.00 plus 20¢ postage. The **MAILROOM**, 1514 Seagull Dr., St. Petersburg, FL 33707

MULTILEVEL MAILORDER OPPORTUNITY in health and fitness field. Unlimited income. Free details. Kidwell, Dept. PM, 1200 Dale, Suite 53, Mountain View, CA 94040

I HAVE made huge profits in mailorder, selling information. Let me show you how. Write, Bryant, Box 4138, Auburn Heights, MI 48057

FORMICA COUNTERTOP RESURFACING. "Don't replace the kitchen countertop!" Earn $40+/hr professionally repairing ugly burn, cut, & stain damage. Begin immediately. Write Renew, P.O. Box 19636, Portland, Oregon 97219

MAILORDER $2,000 MONTHLY POSSIBLE. Selling Information. Write Richway, R2, Box 224, Deep Run, NC 28525

TAX-FREE EXTRA CASH OWNING COIN LAUNDRIES. Nine owner benefits. Information free! Dougherty Company, 1453 Celeis Circle, Highland Park, Illinois 60035.

WATERBEDS Good Money Selling From Home For Leading Midwest Manufacturer. For Catalog and Details Send Brief Resumé to: Waterbed World, Box 30141-PM10, Lincoln, NE 68503

NICKELPLATE (ELECTROLESS) Kits - handguns, tools, etc. Information brochure $2.00 ppd. Battle Group, Dept. 102, Box 13153, Richmond, Virginia 23225.

BELSAW SHARP-ALL OWNERS -Save over 30% on name-brand wheels and files! Immediate shipment. Free catalog. Woodmaster, Dept. H2A, 2849 Terrace, Kansas City, MO 64108. (800) 821-6651.

$50,000 POSSIBLE!! FREELANCING Bathtub and Sink Refinisher. **FREE DETAILS!!** Shepard, 4418 West 30th St., Los Angeles, CA 90016

WRITE For Wealth and Profit Dealers Wanted. Cargen, P.O. Box 52752, New Orleans, LA 70152

WANT TO TELL YOUR BOSS TO SHOVE IT? Produce, Market your own products, ideas. Free information. Waldrops, Box 15041, Alexandria, VA 22309

EARN up to $500 weekly selling books by mail. Send for free valuable information. PM-MailLibrary, 556 Norwood, Spartanburg, S.C. 29302

JANITORIAL CONTRACTING, Your Own Business. New Manual shows how to earn up to $1800 Month Part Time. Free Details. **GINECO,** Box 4547M, Station O, Hamilton, Ontario L8V 4S7

VIDEO GAMES—Consultant's Business Guide— Starting Right-Avoiding Pitfalls-Satisfaction Guaranteed. Send $10.00-Robert's, P.O. Box 1125, Sandy, Utah 84091

MAKE MONEY Your own Carpet Cleaning Business. Free Details. Binder, Box 9894, Atlanta, Georgia 30319

CREATE A $15,000 MONTHLY FORTUNE, Literally Overnite, Professional Secrets $4.95 PP. Seashore Unlimited, Box 823, Swansboro, NC 28584

EASY FORTUNE-Building Home Business! Free Details, Swantco, 3200 W. Britton, Suite 256, Dept. PM10, Oklahoma City, OK 73120

$5,000 return for $10.00 investment - Guaranteed!!! Mail $10.00 for Financial Success Information that will pay you much more than $5,000, although we only guarantee $5,000. Amazingly easy method - anyone can do it!! Mail Today!!! Keep and use for six months. If not satisfied, return for full refund - no questions. Gentry Publishing, Dept P83, 6033 E. Prado St., Anaheim, CA 92807

2000% PROFIT! SELL INFORMATION BY MAIL. FREE DETAIL. FAIRWAY SALES, 5581 GRAFTON, STUART, FL 33494

RECYCLE scrap plastics profitably. Plenty of free sources everywhere. Details. Plastic Recyclers, Box 241R, Hamilton, OH 45012.

MAKE $50,000 PER YEAR! Start profitable home recycling business. Free Information. American, 1010 Liberty, Box 127, Alexandria Bay, New York 13607

BIG Money helping others start Mailorder Business! Libena, 8940 Lyndale, Bloomington, MN 55420

IMPORT/Export Mailorder Secrets Revealed. Including Hongkong/Taiwan Connections. Free Information. Century's, Box 5363, Hacienda Heights, California 91745.

999 Home Businesses you can start with little or no investment. Free Details. Mailbox Publications, 350 Temerack, Springboro, Ohio 45066

SMALL Business Opportunities, Free Details. Johnson, Box 19314, Louisville, KY 40219

WEEKEND - BONANZA! Up To $500.00 an hour. Unique Profession! Thorne, Box 10113P, Chicago, IL 60610

MAKE Big Money! Amazing Guide! Free details. Fortuna, PM1082, Box 6888, Glendale, California 91205

AMAZING HOME BUSINESS! Big Profits! Full or part time. For Details, Send $1.00 - Enterprises, 209 Coral Tree, Rialto, Calif. 92376

INTELLIGENT? LITERATE? Book: "Résumé Writing: How To Start Your Own Business" $5.00. Butler, Dalmar J, Harrison, AR 72601

ARAB BUSINESSMEN Have Money to Buy & Invest. Top Finders Fees Paid. Int. MiddleEast Assoc., 1082PM1, 8291 Flaxman, Huntington Beach, CA 92646

QUALITY Appealing Merchandise. Free Information. Cleytons Gift World, P.O. Box 4533, Evansville, Indiana 47711-0533

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. **ONLY $1.00 FOR BOOKLET** — ($2.00 coupon refundable with first order). **H.E. KAPPEL, POPULAR MECHANICS, DEPT. PMC10, 224 WEST 57TH ST., NEW YORK, NY 10019**

MONEYMAKING OPPORTUNITIES

"MAKING IT RICH IN THE 80'S!" EXPERT Tells how! **FREE DETAILS!** Henco, PM1, 4217 S. 88th Street, Greenfield, WI 53228

LEARN SMALL ENGINE REPAIR for fun or **PROFIT.** 250 pages of fully illustrated procedures make it easy. Can pay for itself in minutes! $9.85. ASP, Box 550, Kenmore, NY 14217.

JUST What You Need—**MORE MONEY!!** "Mailorder Rules For Beginners" $3.00 postpaid. Fulcher, Box 98A, Binghamton, NY 13903. Moneyback Guarantee.

WEALTH Can Be Yours!! Easy, Simple. Minimum Or No Investment. Free Details. American Book, Dept. PM10, 510 Carteret, Beaufort, SC 29902.

MULTI LEVEL Mail Order. **NEW!** Cowing Promotions, Box 18401, Las Vegas, NV 89114.

FREE 5 monthly issues of Opportunity Magazine. Learn the secret to earning extra cash. Issues full of profitable success stories **FREE.** Write: Opportunity, Dept. 805, 8 N. Michigan, Chicago, 60602

TURN PENNIES INTO DOLLARS! Sell Information. Free Details. **RITE-WAY SALES,** 141 Maplewood Drive, Bolingbrook, Ill. 60439

AMAZING! 50 Money-Making Reports. Details, Plus "Making Money With Classifieds" Free. Moneycraft, Ceres, CA 95307-0845

SPARE time fortune in Vinyl Repair. Huge demand creates exceptional profits. We supply everything. Details free. VIP, 2062 Montrose, Chicago, 60618

700,000 BARGAINS BELOW WHOLESALE, Bankruptcy Merchandise, Free Samples, Closeouts, Imports, Surplus. Mail Order. 121 Home Businesses. Free Details. **AMERICAN MONEYMAKERS,** Box 8356PM, Tampa, FL 33674

GET RICH!! Secret few smashes debts — brings Cash, Credit! **FREE**report!! WealthKit-WBM-10, Billings, NY 12510

FANTASTIC earnings mailing from home!! Offer: Rush Stamped Addressed Envelope. Imperial, P-8 X17410, Fort Lauderdale, FL 33318

BUMPER STICKER PRINTING DEVICE. Cheap, Simple, Portable. Free details. Bumper, POB 22791 (GG), Tampa, FL 33622.

MAKE Money selling electronics. Wholesale dealer catalog $5. (Redeemable). ETCO, Dept. 530, Box 840, Champlain, N.Y. 12919

MAKE IT RICH methods of a self-made millionaire. Inquire: Greystone Publications, 984 Glen Ellen, Pottsboro, TX 75078

MAKE PVC PIPE FURNITURE. Spare time home business brings huge profits fast! Free Details. J&M, Box 771PF, Battle Ground, Washington 98604

FREE Unusual Moneymaking Information And Ideas. Unique Enterprises, 1023 Marengo, Forest Park, Ill. 60130

MAKE 2 to 3 times your cost on 2500 fast selling products. $2.00 brings catalog. Refundable on first order. Jimmy King Company, Dept. 6E, P.O. Box 12854, Pensacola, FL 32576

NEW NATIONAL CORP: needs representatives. No get rich scheme, however, unlimited earnings can now be yours. Our Corp will assist you completely. Send $7.95 now and become an active representative for our new 1982-83 Publication. A.L.M. Enterprises, Brewster Station, P.O. Box 8128, Bridgeport, CT. 06605

FABULOUS INCOME! Sell books by mail. We provide sales and advertising instructions. Free Details. Brunswick Books, Dept. PM2, P.O. Box 8172, Newark, De. 19711

WIN Million Dollars Prize Money Weekly. Free Information. Ebly, 323 Franklin, Suite 804/E-36, Chicago, IL. 60606

GOLD dredge Blueprints $15.00. Keizer Press, 120 Churchdale North, Salem, Oregon 97303

EASIEST — Mailorder — Business. Donica, 332PM North 12th, New Castle, Indiana 47362

CASH IN, $36 Billion Home Repairs Bonanza! Small Jobs Mean Big $$$$$. Report Shows You How! Rush $5.00. Handiman, Box 1149, Asheville, NC 28802

$500.00 Weekly Recycling Discarded Tires. Send SASE. LeVallays, Fountain, FL 32438

LEARN typewriter repair. 25 lesson course, parts catalog, $15.00. Satisfaction Guaranteed! Athey, P10, Saxonburg, PA. 16056

3,405 Moneymaking Opportunities-Free Directory! Dynamics-GJB, Box 1306, Stow, Ohio 44224

HOW TO RECEIVE 100 LETTERS PER DAY. . . . . EACH CONTAINING $1.00!! Complete plan, plus eight formulas! Rush $2.00. **PRINCESS,** 8170 Bree, Las Vegas, NV 89118

EXTRA CASH Provide Computerized Financial Aid For Students. No experience, Risk or Investment. Research 35, Box 622, Belmar, N. J. 07719

UNEMPLOYED? Hundreds of Moneymaking Opportunities. Free Information: BMO Enterprises, Box 8129, Kitchener, Ontario, N2K 2B6

RECEIVE LOTS OF MAIL! We'll list you with 100's of Publishers, Wholesalers, Importers, Firms Wanting Home Workers, Mailers, Etc. Send $2.00. Messier Industries, Drawer 491D Federal Building, Worcester, MA 01601-0491.

MAKE $25.00 An Hour! No experience needed - spare time at home becoming supplier to major industry through electroplating small parts and metalizing non-metallics. We furnish all equipment and know-how! Write for free particulars: Malloy, Dept. MC-2-LL, 1512 Jarvis, Chicago, IL 60626

WE SEND YOU THE BEST BUSINESS PLANS AND MONEYMAKING IDEAS FOR YOURSELF. WRITE to: **PARYS** PM, Suite 447, 400 Commonwealth Ave., Boston, Mass 02215

PROFITS 50% at home. Sell books by mail. Details $1.00. Breaux— 1B10, 107S. Jester, Dallas, TX 75211

AVOID RIP-OFFS! Indispensable Book Reveals Hundreds of Opportunities. Selective Systems, Box 457M8, Mission, KS 66201

SELL Books By Mail! Big Profits! Books-PM1082, Box 2133, Sandusky, OH 44870.

SELL "How To Make Money" books by mail. I'll supply everything you need to operate your own home business. Full details $1.00. Nodec Publishing Company, P.O. Box 723, Dept. M110, Bryn Mawr, CA 92318

MAKE YOUR FORTUNE from Mail Order. Free. Nora Nembhard, Box 519PM, Stone Ridge, NY 12484

DON'T POSTPONE success! Our free information points way toward financial security. Write: Patrick Enterprises, Box 307P, Bronxville, New York 10708.

FREE CASH For Christmas or any other purpose! No Gimmick! Details $1.00 (Refundable). JNL, 323 Franklin, 804-J90, Chicago, 60606-7095

(Continued on next page)

MONEYMAKING OPPORTUNITIES

(Continued from preceding page)

$200 Daily. Tap Jewelry Boxes For Gold **HOW? FREE DETAILS.** EPMR, 57561 So. 9th St., Elk Hart, Ind. 46517

START Highly profitable wholesale business!! Details: Chimeere Company, 345 9th Street, PM-10, Atlanta, GA 30309

MAKE Money with your camera $3.00 S.W. Pratt, P.O. Box 23, Northfield, N.J. 08225

TIRED of working for someone else? Start your own easy wealth producing business. Free details. Hilltop Enterprises, 214 Mount Vernon, PM, Council Bluffs, Iowa 51501

LOOK! You can turn everyday **GARBAGE, TRASH,** to **CASH.** Details Free. RE Associates, 413A Grover St., Shelby, NC 28150

HOW To Borrow Money easy. Send $2.95 to: Money, 3985 Brainerd Road, Chattanooga, Tenn. 37411

NAME YOUR OWN INCOME. Profits daily. Guaranteed. No selling. Complete set-up. Plan and sample. Send $2.00 to: Ashton Associates, Dept. 1A, Box 266, Calumet City, IL 60409

MILLIONAIRE reveals "1980's" money-making secrets starting from scratch. Easy, step-by-step instructions. Free details. Sherwood, PM10, 2630 W. Robino, Wilmington, DE 19808.

900% Profit! Rings, Jewelry. Giant color catalog Free. Cameo, 171-J Madison, NYC 10010.

ULTRA-HEALTH, Inc. Nutritional formulas that Work! Newest **MLM** Company. Opportunity for you! Offer the best for Great Success. P.O. Box 1757, Coeur d'Alene, ID. 83814. (208) 772-8502.

FIND Your Fortune, Free Information Write: Guide Books (PM), P.O. Box 368, Wynnewood, OK 73098

THOUSANDS to be made, we show you how, free details. Sparks Enterprises, 3954 Scenic Hwy. PM10, Baton Rouge, LA 70805

FREE valuable information to make you rich, independent, powerful. Tee Enterprises, Dept. 10P, 23400 Wimbledon, Cleveland, Ohio 44122.

FANTASTIC HOME BUSINESS OPPORTUNITY Full or part time, unlimited earnings. Free details with SASE. S.K., Dept. 10, Box 514, Kenner, LA 70063

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. **ONLY $1.00 FOR SOOKLET** — ($2.00 coupon refundable with first order). **H.E. KAPPEL, POPULAR MECHANICS, DEPT. PMC10, 224 WEST 57TH ST., NEW YORK, NY 10019**

RABBITS-CHINCHILLAS-FUR BEARING ANIMALS

AMAZING Profits! $10,000 Yearly Raising Rabbits for Wool and Breeding. Details—$2.00. American Angora, Malta 12, Montana 59538

RAISE RABBITS SUCCESSFULLY 68 Page Booklet Tells How. $1.00. American Rabbit Assn., H1, P.O. Box 426, Bloomington, Illinois 61701

$500-$1000 Month Plan raising rabbits for us. Free details. White's Rabbitry, Box 1388PM, Hudson, Ohio 44236

GUARANTEED Income. $10.00 (refundable) for literature. Chinchillas, Box 6294, Mesa, Arizona 85204.

EARTHWORMS, LIVE BAIT

FISHERMEN stop digging or buying worms! Simple device, plans $3.00. **WORMFINDER,** 2815 Ladoga, Long Beach, CA. 90815

FREE Literature Raise Fishworms, Crickets, Red Wigglers — 1000 — $8.95. 5000 — $42.50. Postpaid with Free Book on How and Where to Sell Carter Fishworms, Plains, GA. 31780

OF INTEREST TO ALL

NITE-WRITER. The authentic Pen - Light. Battery and refill included. $9.98 U.S. Beenar Marketing, 7535 Wildfern Drive, Dept. PM10, Mississauga, Ontario, L4T 3P7

FREE Promotional Albums, Concert Tickets, Stereos, etc. Information: Berry Publications, 477 02nd Street, Brooklyn, NY 11209

NEED CREDIT? Get MasterCard, others, w/no credit check. Guaranteed! Simple, Legal. Plus other credit secrets. Free details! Send SASE to **INFLATION REPORTS, PMJ, BOX 60146, LOS ANGELES, CA 90060**

NOW, You can draw. **FREE** - Complete details plus first easy lesson from Disney artist. Bruce McIntyre - PM7, 3471 Crownsworth, Corona, CA 91720. (714) 953-7452

EMERGENCY Survival Kits And Equipment - Outdoorsmen, Vehicle, Home. May Save Your Life. Free Information. Redico, 144 East 9th, Durango, CO 81301

UNIQUE Gift And Card Sending Service. Six Gifts And Cards Sent For $25.00. Send For Order Form. Mt. Sinai Mail Order, 14 Barnsley Crescent, PM, Mt. Sinai, New York 11766

MONEY Management-reduce Debts, increase Savings. **FREE** Details. . . . Tobys Associates, 2318 Second Ave., 595-11, Seattle, Wash. 98121

FREE Information ---Win at Baccarat, Roulette. Free Blackjack Basic Strategy Flashcards. Send $2.00 Postage/Handling. L.R. Enterprises, Dept. O, P.O. Box 255704, Sacramento, CA 95825

DUSTLESS Ash Remover with carrying handle for fireplaces, inserts, etc. 9 × 18" - hot/cold ashes, lightweight, $29.95. Tyndall Enterprises, Inc, 801 West Ninth Street, Ayden, NC 28513

FREE Interesting, Illustrated, Solar Energy Book Catalog. Write: Kal Products Co., 11409 W. 70 Terr, Shawnee, Kansas 66203

SAVE Thousands On Home Mortgage Interest. Legal, Guaranteed, Report $5.00: Griffith, 5815 Callaghan, 104B, San Antonio, TX 78220

SAVE THOUSANDS OF DOLLARS in income tax. Learn how to pay thousands less or even no income tax. Report tells how in easy to understand form. U.S. gov't will even help. No tax shelters. Anyone can do it if you know how. This report is incredible! Rush $4.00. MCG, 300-311 Church, Nashville, TN. 37201

WILL KIT - Don't die without a will. Be certain your valued possessions will be disposed of according to your wishes. Our comprehensive kit includes two will forms and an informative 64-page booklet, "Wills - How to Make and How to Break Them," written by a noted attorney. Also, "Personal History and Family Asset Sheet." $3.50. L.M.S., Box 55195, Tulsa, OK 74155

FULL COLOR GENERAL MERCHANDISE DISCOUNT CATALOG. Up to and Over 75% off on Name Brand Items. $2.00. Western Products, SR2, Box 272A, Coulee City, Wash. 99115

FREE Catalog. Send Self Addressed Stamped Envelope. Texas Twin, Drawer 1028-M, La Porte, Texas 77571

FLEA markets, garage sales - Knowhow for fantastic bargains! $3.00. 2118 E. Arapaho, Suite 602, Richardson, Texas 75081

DISCOVER BOB CONKLIN'S FORMULA For Financial Success, Health, Happiness. For Free Info. Send SASE To: House of Treasures, Dept. PM, 509 Yosemite Ave., Fresno, Calif. 93720

OF INTEREST TO WOMEN

BE SAFE! How to Protect Yourself From Crime! Free Listing. SASE. Vee Rhoden, PM10, Box 7296A, Orlando, FL. 32854

GOVERNMENT SURPLUS

MOTORCYCLES — JEEPS — HELICOPTERS — AUTOMOBILES . . . GOVERNMENT SURPLUS DIRECTORY — MONEYBACK GUARANTEE— How, where—$2.00. GS Information, Department 110, Federal Building, Box 3913, Springfield, Massachusetts 01101

SURPLUS Jeeps, Cars And Trucks Available. Many Sell For Under $200. Call 312-742-1143 Ext. 7133. For Information On How To Purchase.

GOVERNMENT SURPLUS . . . Millions of items (including Jeeps) . . . low as 1¢ on dollar! Most complete Directory available — $2.00 (guaranteed). **DISPOSAL,** Box 19107-AJ, **WASHINGTON, DC** 20036

GOVERNMENT LANDS FROM $7.50 ACRE! Homesites, farming, vacationing, investment! "Land Buyer's Guide" plus nationwide listings - $2.00. Lands, Box 19107-AJ, Washington, DC 20036

1982 Surplus Army, Navy store 64 pages illustrated catalog. Send $2.00. Ruvel, 3037 N. Clark, Dept. J-10, Chicago, IL 60657

GOVERNMENT SURPLUS JEEPS SOLD FOR $44.00. CARS, TRUCKS, MANY OTHER ITEMS AVAILABLE. FOR DIRECTORY CALL 312-888-4347 EXT. J-212.

"GOVERNMENT SURPLUS" JEEPS $30.00! 800,000 Items! Complete Information Your Area. **LARGEST OFFICIAL DIRECTORY,** $2.00 (Guaranteed). **SURPLUS** (A245), 4620 Wisconsin Northwest, **WASHINGTON, D.C. 20019**

LOANS BY MAIL

BORROW $25,000 "overnight." Any Purpose. Keep Indefinitely! Free Report! Success Research, Box 19739-AX, Indianapolis, Indiana 46219

BORROW INTEREST FREE! $500-$30,000! All eligible. Repay anytime. No gimmicks. Free Details! Infohouse, Box 1004-PM10, New York, NY 10003

MONEY Problems? Free Book describes Loans, Cash, Government Grants, Other benefits, available to individuals. Write: Associates, Box 98-A4, Brooklyn, New York 11235

BORROW FROM HOME! Any amount, any worthwhile purpose, within 30 days. Competitive Rates. Also, you can earn substantial income as a Money Agent. No Experience—Own Hours. National Company to assist every way possible. No Gimmicks! Free Details: DFC, Dept. 10-C-10, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

BORROW $100-$100,000! Instant Reply! No Co-signers! Rush Stamped Envelope! Financial, Box 5487(P), Richardson, TX 75080

GET cash grants—from Government. (Never repay.) Also, cash loans. All ages eligible. Complete information, $2.00 (refundable). Surplus Funds-PM, 1629 K St., Washington, D. C. 20006

CASH Loans—Borrow by mail up to $25,000! Approval guaranteed! LTD-PM, Box 937, Ft. Lauderdale, FL 33302.

BORROW By Mail! Free Details! MBG-PM1082, Box 2298, Sandusky, OH. 44870.

MASTERCARD/ Visa By Mail! Write! Credit-PM1082, Box 2298, Sandusky, OH. 44870.

BUSINESS Loans From $15,000. Nova Financial, Box 7373, Hollywood, FL 33021

DIVORCE

DIVORCE? Winning Information, $1.00. **MEN'S RIGHTS ASSOCIATION,** 189B, Forest Lake, MN 55025-0189

PERSONAL

FINANCE YOUR DREAMS with Government and Foundation Grants. Free Details. TOU PM10, 432 PCH, Hermosa Beach, California 90254.

BIBLE Questions answered. Stamped envelope. Bylon, 17187 Benfler, Detroit, Michigan 48219

COLLEGE DEGREES BY SPECIAL EVALUATION of **EXISTING** Credits & Job Experience. Fast. (614) 863-1791. Write: Box 13151-T10, Columbus, Ohio 43213.

COLLEGE DEGREES BY MAIL. Renowned Universities offer fully-accredited Bachelors, Masters, PH.D's . . . Free revealing details. Counseling. Box 317-MP-10, Tustin, California 92680.

CONFIDENTIAL Chicago Mailing Address: Business, Personal. Since 1944! Mail Center, 323(k) Franklin, Chicago, 60606

BORROW By Mail! Free Details! MBG-PM1082, Box 2298, Sandusky, OH. 44870.

DEBT RELIEF instantly! Legally, without bankruptcy! Stop creditor harassment, wage garnishments, repossessions, foreclosures. Restore credit! Method $2.00. Dynamoney, Box 33014(M), Decatur, Georgia 30033

REMAILING SERVICE

MONTREAL WORLDWIDE REMAILS Fast Service Confidential $1.00 Each. 1462 Bourgogne, Chambly, Quebec J3L-1Y5

DEPENDABLE, Confidential Remailing. Postal Shoppe, 369 East 900 South, Salt Lake City, Utah 84111

NEW YORK REMAILS! Receiving Forwarding. Adirondack Enterprises, Box 174, Hudson Falls, N.Y. 12839

PRIVATE ADDRESS. Dependable. Professional Mail Forwarding, Box 581A, Milton, Mass. 02186

FLORIDA REMAILS Receiving-Forwarding. Allen, 6326 Autlen Drive, Jacksonville, Florida 32210

SASKATCHEWAN Remailing. Central, Box 101, Foam Lake, Saskatchewan, Canada S0A 1A0

CONFIDENTIAL MAIL and **PHONE** Calls Received and Forwarded Daily (SASE). Central, Box 369PM, Claymont, DE 19703

UNLISTED ADDRESS. Discreet and confidential. Remail $1.00 Single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

CONFIDENTIAL Mail Forwarding/Receiving. Orlando Mail Drop, Box 18039PM, Orlando, FL 32860

NEBRASKA Remails. Confidential Business Personal. Dependable. Sendco, Box 31751, Omaha, NB 68131

WORLDWIDE MAIL FORWARDING 25 years experience. **NATO,** Box 1418, Sarasota, FL 33579

CANADIAN Remails $1.00 stamped, single. The Exchange, Box 850, Cobourg, Ont., CANADA K9A 4S3

MISCELLANEOUS

TELEPHONE SUPERMARKET!! All Phones and Accessories. Install Yourself & Save $$$ - **FREE CATALOG.** The Phone Company, Dept. 1001, 1472 Oddstad Drive, Redwood City, CA 94063

PHOTO ID. Sealed in plastic. All states, provinces. 24-hours. **GUARANTEED.** Send $6.00 (2/$10.00), photo, name, address, height, weight, hair, eyes, birthdate. **CARDINAL,** 2071-46 Emerson, Jacksonville, Florida 32207.

(Continued on next page)

MISCELLANEOUS

(Continued from preceding page)

PHOTO IDENTIFICATION CARDS . . . Certificates . . **GUARANTEED!!** Samples 25¢ . . Bascco, Box 3461-PM-82, Providence, R.I. 02909.

ORNAMENTAL Iron Designs. Book of 1600 beautiful practical designs for railings, columns, etc. Free Literature. Cunningham, Box 20005, Salt Lake City, Utah 64120-0005 — — (3861 South 3200 West)

IDENTIFICATION CARDS . . . CERTIFICATES . . . 52 SELECTIONS. Samples 25¢. Documents, Box 5684-T, El Monte, Calif. 91731

WIN Magazine and Television Contests!! Tried and True Methods. Free Information. Villella, P.O. Box 77, Monroe, Ohio 45050

FREE RECORDS, LP's, Promotional Albums. Free Details. **MUZIK**, 855-PM10, Main, Springfield, Mass. 01105

PHOTO Badges Get Action! Identifies You And Gets Personal Attention - $5.00 (3/$12). Send Snapshot. Free Details. Polita, 6451X Ashton, Detroit, MI 48228

STOP Vehicle Theft! **INEXPENSIVE** Device Saves. Unique, **EXTREMELY** Effective! Details, Write. Manley's, Dept. PM301, 1203 S. 29th Ave., Box 10961, Yakima, WA 98909

HELP - HELP - HELP! Avoid getting attacked! Protect yourself: carry **RED ALERT** with you always! Weighs only 2 ozs. Free brochure. Sohma Corp., Box 636M3, Manhattan Beach, CA 90266

COLLEGE STUDENTS!—Improve your grades! — Research catalog—306 pages—10,278 topics—Rush $1.00—Research, Box 25918K, Los Angeles, 90025. (213) 477-8226.

GLASS ETCHED MUGS. Your Initials in Modified Old English Letters. $5.00 + $1.00 Shipping. C/A Productions, P.O. Box 4, Lumberton, NJ 08048

WANTED MISCELLANEOUS

GOLD, Silver, Platinum, Mercury, Tantalum wanted. Ores assayed. Free circular. Wholesale Terminal, P.O. Box 191, Norwood, MA 02062

SCRAP SILVER CONTACTS, FORKLIFT CONTACTS, Silver Solder, Sterling, Gold Plated. Robert Laszczak, 652 Myrtle St., Elizabeth, NJ 07202

FOR SALE-MISCELLANEOUS

REVOLUTIONARY! Flexible Ratcheting Screwdriver. Reaches locations never before accessible. High-carbon tool steel, torque tested to 17 ft/lbs. 3/16", 1/4" slots, #1, #2 Phillips bits furnished. Adapter for your 1/4" sockets. Warranted. Satisfaction Guaranteed. $17.95 + $1.50 postage and handling. Falconer, Box 20102-PM, Indianapolis, Indiana 46220-0102.

HEARING AIDS

HUGE SAVINGS. Eliminate dealer mark-ups. Free Trial. Batteries Wholesale. Terms arranged. Lloyds-PMC, Rockford, Illinois 61104

FREE HEARING AID CATALOG - Save 1/2 by mail! Write. "Money$avers", 9530-PM10, Langdon, Sepulveda, California 91343. **NOT** sold in California.

SAVE Half by Buying Hearing Aids Direct. Month Trial. Rea Company Inc., Box 364, Bridgeport, Ohio 43912

FREE Hearing Aid Catalog. Huge Savings. No Salesman Will Call. Try Before You buy! Rhodes, Dept. 132-T, Brookport, IL 62910

TOBACCO

PIPE SMOKING -Learn How-Guide $4.98— White Heron Enterprises, Box 2178M, Virginia Beach, VA. 23450

SCIENCE & CHEMISTRY

LABORATORY Chemicals, Glassware — Apparatus, Catalogue $1.00. Deluxe Scientific, 934 S. 13 Street, Manitowoc, Wisconsin 54220

FORMULAS, PLANS, ETC.

SECRET Formula Rids Pets of Dreaded Mange. $5.00 SASEL to: Lloyd's, 4245 S. Cornwell, Clare, MI 48617

MONEYMAKING CHEMICAL FORMULAS - THOUSANDS! CATALOG $3.00 (REFUNDABLE): GWA3, Box 193, Brookfield, Wisconsin 53005-0193

ANY FORMULA $10.00. Catalog $1.00. J. Belfort, Box 568, Chicago, 60690

SPECIAL SERVICES

INFORMATION On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

HERBS

PURE HERBS From History & Folklore. Write for **FREE** Book, "Common Herbs for Common Illnesses." Estes-PMC, Alma, Georgia 31510

BETTER HEALTH

NO MORE CIGARETTES!!! Here's the most practical and workable method for beating the nicotine habit ever published! It includes tests you can take to see if you are ready to quit, what kinds of medications to use and, "The Box"—the ultimate weapon against the cigarette habit. Send $5.00. Hester Books, P.O. Box 183, Addison, Texas 75001 (How to Stop Smoking)-PM10.

AMAZING Formula Clears up **HERPES** Blisters in Hours! Ingredients from Health Food Store. For Formula send $10.00, now to: Cleo, P.O. Box 30054, Bakersfield, CA 93385.

HEMMORRHOIDS! Simple Cure. **FREE** details. Foord House, 554 California Street, Rio Vista, Calif. 94571

NEW "WATERPURE" MINIATURE BOTTLED-WATER MACHINE!! Easy (no plumbing) under-sink hookup diverts water thru system to supply 3,000 gallons of bottled water **FROM YOUR SINK FAUCET** for a mere $14.50 **YEARLY** filter change! **THREE WEEK FREE TRIAL!** It does the job or return it! Pay only $150 or make three $55 monthly payments. Rush order and home phone number. Westco, Box 95283M, Atlanta, GA 30347. Phone toll-free 1-800-431-1953 Ext. 818. NY 1-800-942-1935. (Whole-House-Well system only $284.00), **EXCLUSIVE AREAS GRANTED DEALERS**

STOP AGING, Never Grow Old Again, Reverse Aging, Be Young, Live Forever, New Scientific Discovery. Satisfaction Guarantee. $2.00 For Information. Freedom Books, Box 50459C, Washington, DC 20004

BACKACHE? Backswing™ has helped thousands gain **FAST RELIEF!** Free information. Toll Free **1-800-426-5515.** Holistic Health Resource Center, Box 20037, Seattle, WA 98102

QUIT Smoking without Gaining Weight. Smoke all you want for a Month while 'unlearning' the Habit of Smoking the Easy Way. Satisfaction Guaranteed. Send $3 to: Pet. 2576 Potter St. #2, Eugene, OR 97405.

FOR THE HOME

CARPET WISE- What you should know about carpet. How to buy, measure, and save money. Homeowners and Salespersons Carpet Guide-Illustrated. $6.95 to: R&L Enterprises, 504 SW 17, Richmond, Ind. 47374. Money back Guarantee

GIFTS- Kitchen, home Catalog $1.00 refundable. Bullfrog Hollow, Lyme, CT 06371

FLOWERS, PLANTS & NURSERY SUPPLIES

GROW GINSENG, Very Profitable. Have seeds, roots. Goldenseal. Complete information. K. Collins, Viola, Iowa 52350

LEARN Landscaping at home. Free booklet. Lifetime Career Schools, Dept. A-18, 2251 Barry Avenue, Los Angeles, California 90064

RECIPES, COOKING, ETC.

HEALTHY, EASY - 50 NATURALLY SWEETENED DESERT RECEIPES WITHOUT SUGAR. $3.00. Estelle Darnell, P.O. Box 20302, San Diego, CA 92120

FAVORITE Recipes - $3.00. Kate Buckner, 4725 Bavarian, Mobile, AL 36619

DELICIOUS WALLEYE recipes. $2.00 sase. "Hasse," 4070 Foss, Minneapolis, MN 55421

MOUTH watering California Sunshine Recipes. Orange Meringue Pie, Magnificent Orange Cake; Pineapple Dump Cake, Old-tyme hot water pie crust, All for $5.00. Send SASE to: Lezah's Recipes, Box 86063, San Diego, CA 92138

OLD Timer's Home Brew Recipe Made in 4 Days, Ingredients Bought in Grocery Stores. Send $4.00 & SASE To: P.O. Box 526, Sweet Home, Oregon 97386

COMPLIMENTS GUARANTEED Old fashioned brownie and frosting recipe. Send $1.00. J&B Enterprises, 3945 Plymouth Church Road, Beloit, WI 53511

STUFF-IT 101 easy- elegant- economical omelets. All occassions. $5.00. LaurelRose Publishers, Box 1415PM, Everett, WA. 98206

MOMS Moneysaving Recipes $3.50. P.O. Box 372, Plainwell, MI 49080

FINNISH Pastiee. A Complete Meal, Serve Hot Or Cold. $3.00. Sieu Enterprises, PO Box 251, Canby, OR 97013.

MOMS RECIPES. Ten of my mome favorite desert and cookie recipes. $3.00. T. Scruggs, Box 288, Waller, Tx. 77484

FIFTEEN DELICIOUS SOUTHERN DESSERTS $3.00. SASE. B. Smith, Box 951, LaGrange, GA. 30241

SCRUMPTIOUS Chocolate Popcorn Balls for unusual treats for Halloween. Send $2.00 to: Recipe, P.O. Box 18704, Wichita, Kansas 67218-0704

SECRET Candy Recipe, Fantastic, Delicious. $2.00. Box 32154, Phoenix, AZ. 85064

BEEF BURGUNDY. Classic French Recipe. Delicious. $2.00. Carlson, Box 4111, Mt. View, Calif. 94040

130 Authentic **SOUTHERN RECIPES** only $5.00. Ridge, 213 88Th Street, Brooklyn, New York, 11209

CHOPSTICKS Set, Instructions, Plus Recipes: Eggrolls, Almond Chicken, Peking Duck - $5.00. Chow's, 15352 Marviste, Whittier, CA. 90605.

DELICIOUS SPECIALTY BREAD recipes. Apricot, Carrot, Cranberry, Banana Nut. $3.00 and SASE. Woodworks, P.O. Box 41, Dept. A9, Otis Orchards, WA 99027

TEN Delicious Tortes $5.00. Pohlend, P. O. Box 760, Wyocena, WI 53969

WINEMAKING, BEERMAKING & OTHER RECIPES

WINEMAKING-BEERMAKING-GASOHOL. Free Supply Catalog. Yeast Equipment. Continental, Box 68016-PM, Indianapolis, Ind. 46268

WINEMAKERS-Beermakers: Free illustrated catalog of supplies. Semplex, Box 12276R, Minneapolis, Minnesota 55412-0276

MAKE QUALITY BEER, Wine. Free catalog. Village Store, Box C-51PM, Westport, MA 02790

WINEMAKERS-BEERMAKERS— Free Catalog—Fast Service—Large Selection; Kraus, Box 7850-L, Independence, Missouri 64053.

BEERLOVERS! Brew American and European beer. Complete kits. Equipment. Supplies. **FREE** details. Duane Imports Inc., Department PM, P.O. Box C-500, Hershey, PA. 17033

BEER LOVERS — Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

FREE BEERMAKING BOOK Plus Catalog. Finest Equipment, Ingredients. Fully Guaranteed. SPI, Box 784-M, Chapel Hill, NC 27514

FREE ENCYCLOPEDIA Winemaking, Beermaking, Supplies, Equipment Ingredients. Vynox, P.O. Box PM7498, Rochester, NY 14615

BEERMAKING KIT. Makes 48 bottles of premium beer. **SATISFACTION GUARANTEED.** Send $29.95 for kit. Extra ingredients $7.50. **FREE** catalog. **HOME BREW,** Inc. Box 158, Haslett, MI 48840.

BEER BREW your own. Complete equipment list, recipes. Send $1.50. Beer Recipes, Box 271, Mahomet, Ill. 61853

BEERMAKERS ONLY! Free Specialist Catalog. William's, Box 461M, Oakland, California 94604.

WINEMAKERS-BEERMAKERS Fresh Stocks, Fast Service, Free Catalog. O'Brien's, Box 284D, Wayne, IL 60164

WINE/BEER MAKING Catalog: B&J Enterprises, 1845 South 19th, Springfield, Illinois 62703

MOONSHINE! Whiskey, Gin, Vodka, Alcohol! Homebrewing Manual, $2.00 (refundable). Gourmet, 723A Disston, Philadelphia, PA. 19111.

WINEMAKING- Beermaking, Fast Service, Low Prices, free catalog. Vineyard & Brew, 545 Ashmun, Soo, MI 49783

DANDELION WINE simple recipe. $2.00 SASE. Eric Arnold, 410 E. Dixie, Bloomington, IN. 47401

BEER COOKERIE! 26 superb recipes. Appetizers thru desserts. $3.00 —SASE — Clerk, 1211 Broadway, Burlingame, CA 94010

BURGLAR ALARMS & HOME PROTECTION

BURGLAR, fire, car! Finest equipment! Save! Free catalog. AAS, 414B Loma Square, Birmingham, AL 35216.

FREE discount catalog, auto and home security products. Send SASE. to: PO Box 291MI, Fanwood, NJ 07023.

LOW Cost Security Devices For Home Protection. Free Literature. Peterzell, Box 966Q, Winter Park, FL. 32790

PROTECT Home and Auto with Electronic Alarm Warning Decals. 12 Decals $4.00. JDS Enterprises, P.O. Box 319, Novi, Mich. 48050

1 Million Famous LCD Quartz Calendar Watches To Be Sold For Only $5 Apiece In Mammoth Publicity Drive

All who wish to apply for a watch should write to the company before Midnight, December 25, 1982

NEW YORK—One million famous LCD Quartz calendar watches will be sold as part of a publicity campaign for only $5 apiece to the first one million persons who apply in writing to the company before Midnight, December 25, 1982.

These are the same nationally publicized LCD Quartz watches advertised in The New York Times, TV Guide, Parade and other leading publications, with a built-in computer so powerful it never needs winding and which is accurate to within seconds per month. Time and date are displayed in full Quartz digital mode; and a unique "backlight" allows viewing even at night or in total darkness.

These famous LCD Quartz calendar watches will not be sold at this price by the company in any store. The only way to obtain one at this price is to apply in writing to the company address (below) not later than Midnight, December 25, 1982.

Each watch carries a full one-year money back guarantee and will be replaced by the company, free of charge, if it ever fails to function.

There is a limit of two (2) watches per address at this price, but requests which are mailed early enough (before December 17) are permitted to order up to 5 watches.

To apply for an LCD Quartz calendar watch, mail your name and address *and this original printed notice* together with $5 for each watch desired. Add only $2 shipping and handling no matter how many watches you are requesting. NOTE: Specify model and color choice for each watch as follows: Men's Gold (Item #20710A), Men's Silver (Item #20720B), Ladies' Gold (Item #20730C), Ladies' Silver (Item #20740D). Mail to: **Delucca, Goldrich & Lord, Ltd., Calendar Watch, Dept. 114-2, Box 1020, Westbury, N.Y. 11595. (D20700)**

© 1982 Delucca Goldrich & Lord Ltd

IT TOOK YOUR BUMPS. PROTECTED YOU FROM THE ELEMENTS. AND GOT YOU OUT OF A FEW JAMS.

NOW IT'S TIME TO SETTLE UP.

Your car took care of you. Now's the time to take care of it—during NAPA Fall Car Care Days. You'll find what you need for your domestic or import car at NAPA auto parts stores and participating garages and stations. Look for the NAPA Fall Car Care Days poster. And reward a clutch performer.

Check your Yellow Pages

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

Ultra Kings, 2 mg. "tar", 0 .3 mg. nicotine; Lights Kings, 9 mg "tar", 0 .8 mg. nicotine av. per cigarette by FTC method; Filter Kings 16 mg. "tar", 1 .1 mg. nicotine av. per cigarette, FTC Report Dec. '81

There's only one way to play it...

Wherever the music is hot, the taste is Kool. At any 'tar' level, there's only one sensation this refreshing.

Original

Low 'tar'

2 mg.

©1982 B&W T Co